

REPORT OF THE
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AGRICULTURE

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PART II
POLICY AND STRATEGY



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P R E F A C E

The Report of the National Commission on Agriculture comprises 69 chapters in 15 parts. A complete list of chapters and parts is given in pages (iii) to (v). The Terms of Reference of the Commission and its composition are given in Part I—Chapter 1—Introduction.

This volume, entitled 'Policy and Strategy', is Part II of the Report and is divided into the following five chapters :

5. Agriculture in Economic Development
6. Growth with Social Justice
7. Policy and Strategy
8. Centre-State Relations in Agricultural Development
9. Nutrition.

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5

AGRICULTURE IN ECONOMIC DEVELOPMENT

1 INTRODUCTION

5.1.1 In this country, agriculture is the largest sector of economic activity. It provides not only food and raw materials but also employment to a very large proportion of the population. Being the dominant sector, the improvement or changes in the national output depend on the output in agriculture. For the same reason, it has to provide the capital required for its own development and make available surpluses for national economic development. In the early stages of economic development, the exports of primary produce earn valuable foreign exchange which can be used to import capital goods for the development of industry and infrastructure. For all these reasons, an improved and efficient agriculture is a necessity in agriculturally dominant economies. The economic history of the now developed economies amply demonstrates that improvement in agriculture preceded and paved the way for rapid strides in industry, transport and other non-agricultural activities.

5.1.2 While the development of agriculture seems to hold the key to the progress of the economy as a whole and should receive due emphasis, the linkage between agricultural and non-agricultural sectors also needs to be recognised. The interaction between agricultural and non-agricultural sectors facilitates the growth of both. The demand for non-farm inputs of industrial origin stimulates industrial activity. The industrial growth in turn increases the demand for wage goods and raw materials, which helps expand agricultural employment and income. Increased agricultural incomes create market demand for industrial consumption goods thereby providing a stimulus to industrialisation and market development. As commerce develops, the tertiary sector also expands. As development proceeds along these lines, opportunities for diversified employment are opened up to reduce the pressure of population that would have otherwise crowded the agricultural sector to draw its sustenance therefrom. If a country had enough mineral resources, by exporting which it could import food, raw material and capital, the emphasis on its agriculture could be less. But many developing economies are not so fortunately placed. In essence, therefore, agriculture has a crucial role to play in the country's economic development.

5.1.3 In India, the vital role of agriculture arises out of the position the agrarian sector occupies in the overall economy of the country. Eighty per cent of the population reside in the rural areas and 72 per cent of the work force depend on agriculture. In the following paragraphs, we review the place of agriculture in India's economy in the past and attempt to indicate its future potential in furthering the economic progress of the country.

2 AGRICULTURE IN INDIAN ECONOMY

Contribution to National Income

5.2.1 The contribution of the agricultural sector to national income, foreign exchange and employment is a measure of that sector's importance in the overall economy of the country. Official estimates of national income and its components are available, on a regular basis and annually, only since 1948-49. Prior to this, based on estimates (vide Appendix 5.1) made at different points of time by individual scholars and administrators (like Dadabhai Naoroji, Baring Barbour, Curzon, Vakil and Muranjan, it seems that the share of agriculture in the national income had remained around 66 per cent (or two-thirds) from the later part of the nineteenth century till about the World War I. The estimates made by V.K.R.V. Rao for later periods¹ reveal that the proportion of agriculture to the total output had undergone a change and was 57 per cent during the period 1925-29 and 53 per cent for 1931-32. Another estimate by the then Ministry of Commerce of the Government of India placed the contribution of agriculture at 44 per cent for the year 1945-46. Although these estimates are not strictly comparable due to differences in concepts, geographical coverage and methods of computation, it is seen that the share of the agricultural sector declined over a period of 25 or 30 years prior to Independence, although it is not clear as to how much of the decline is due to the differences in methodology adopted for computation.

5.2.2 More firm estimates are available since Independence. For 1948-49, official estimates placed the share of agriculture in the national income at 49 per cent. In 1950-51, its share in the net domestic product was reckoned at about 56 per cent and during the following ten years, it remained above 50 per cent. After this, the percentage share declined and was about 45 per cent in 1970-71. Although agriculture's contribution

¹ Mukherjee, P. K. 1958. Agricultural Output and National Income in India, in Studies in Agricultural Economics 4-5. Bhattacharjee, J. P. (Editor), Tenth International Conference of Agricultural Economists, Bombay, Indian Society of Agricultural Economics.

declined further during the next two years, it was because production was less due to unfavourable weather. Nonetheless, the agricultural sector continues to predominate and contributes a large share of the national output.

5.2.3 The importance of agriculture can also be seen from its contribution to the growth of the national output. During the fifties and the sixties, the index of net domestic product at 1960-61 prices recorded a rise of 76 points, the contribution of the agricultural sector being about 34 per cent. Looked at from another point, the growth of the national economy gets stunted with setbacks in agricultural production, as happened during 1965-67 and 1971-73. The increase in the size of the national output is still substantially dependent upon the performance in agriculture. This will be clear from the table below :

TABLE 5.1

Indices of Net Domestic Product@ at Factor Cost and Percentage Contribution of Agriculture+.

Year	Indices of		Percentage contribution of agriculture, forestry & fishing to net domestic product
	net domestic product at factor cost	sub-total agriculture, forestry & fishing	
Base 1960-61=100			
1950-51	68.4	75.0	56.1
1955-56	81.5	86.4	54.3
1960-61	100.0	100.0	51.2
1964-65	120.2	110.0	46.9
1965-66	114.2	94.8	42.6
1966-67	115.6	93.3	41.4
1969-70	137.5	116.6	43.4
1970-71*	144.2	125.6	44.7
1971-72*	146.1	123.3	43.3
1972-73*	144.9	114.6	40.5
1973-74**	149.3	121.5	41.7

@At 1960-61 prices.

+1975. National Accounts Statistics 1960-61—1972-73. New Delhi, Central Statistical Organisation, Department of Statistics, Ministry of Planning, Government of India.

*Provisional.

**Quick estimates.

5.2.4 Although the agricultural sector has been the major contributor to net domestic product, its growth rate over the years has been very low. For the period 1949-50 to 1973-74, the rate has been more or less at par 2—131Deptt. of Agri/76.

with the rate of increase of the population, although the net domestic product has grown at a somewhat higher rate.

Contribution to Employment

5.2.5 Agriculture, directly or indirectly, has continued to be the main source of livelihood for the majority of the population in India. The decennial censuses indicate that the proportion of the work force supported by agriculture has been around 70 per cent. These censuses also show that the overwhelming majority of workers have been engaged in cultivation. Dependence of the working population on other fields of agriculture, like livestock, fisheries, forestry, etc., is small and as a proportion to total workers, it has remained more or less constant during the last two decades. The distribution of workers by broad occupational categories is shown in Table 5.2

TABLE 5.2
Percentage Distribution of Workers by Industrial Categories+

Year	Cultivators	Agricultural labourers	Livestock, forestry, fishing, hunting, plantation, orchards, etc.	Total agriculture	Non-agriculture
1951	50.0	19.7	2.4	72.1	27.9
1961	52.8 (53.2)	16.7 (15.5)	2.3 (2.5)	71.8 (71.2)	28.2 (28.8)
1971	43.4	26.3	2.4	72.1	27.9

+1972. Pocket Book of Information : 25. New Delhi, Department of Economic Affairs, Ministry of Finance, Government of India.

Figures in parenthesis are those adjusted on the basis of the concepts used for 1971 Population Census.

The data reflect the broad pattern of economically active population at different points of time. They also reveal that the dependence of the workers on agriculture has not significantly changed over the last two decades. The rate and pattern of investment in the other economic sectors have not been such as to draw away surplus rural labour and relieve the pressure of population on land.

5.2.6 Since the growth of the agricultural sector was very slow, it failed to create enough opportunities for additional employment. This resulted in widespread under employment and a rising backlog of unemployed as

the labour force swelled with the increase in population. The Working Group on Agriculture of the Committee on Unemployment¹ estimated that the extent of unemployment and underemployment in the rural areas in 1969 as 22.52 million man-years including 7.82 million totally unemployed. Raj Krishna in his estimates² for 1971 placed the figure at 26.2 million persons including the wholly unemployed and the underemployed who are available for work.

5.2.7 The agricultural sector, or more generally the rural sector, has been the supplier of manpower to industry. For the pre-Independence period, the findings of the Royal Commission on Labour³ are indicative of such contribution made by the rural sector. Its main findings for factory employment were that

- (i) the smaller centres everywhere drew on the surrounding rural areas for all the workers required except the labour demanding special skills;
- (ii) the only centres which had reached the state of being compelled to go far a field for the bulk of their labour were Jamshedpur, Bombay and Hooghly;
- (iii) the Indian factory operatives were nearly all migrants from rural areas; and
- (iv) the recruit to industry continued to regard as his home the place from which he came.

The Commission considered the link with the villages as a distinct asset. The Labour Investigation Committee⁴ on the basis of information thrown up by Family Budget Surveys undertaken in 1943-44 also concluded that factory workers were largely immigrants but mentioned that the majority of them had little stake in agriculture. Subsequent findings, particularly the studies undertaken in several urban centres by the Research Programmes Committee of the Planning Commission, support the conclusion reached by the Labour Investigation Committee. In the last twenty years the village nexus seems to have loosened further. Earlier, the jute and cotton textile industry, exploitation of minerals like mica, coal, iron ore and manganese attracted rural labour. The mineral exploitation saw the emergence of migration towards the end of the last century. It gathered momentum after Independence with the location of factories in what were

1. 1973. Report of the Committee on Unemployment, Vol. I (A): 433. New Delhi, Ministry of Labour & Rehabilitation, Government of India.

2. Raj Krishna, 1973. "Unemployment in India"—Presidential Address, Indian Society, of Agricultural Economic : Indian J. Eco., XVIII (i) 8.

3. 1931. Report of the Royal Commission on Labour in India, 10-12, cited in Report of the National Commission on Labour, 1969 : 67, New Delhi Ministry of Labour, Government of India.

4. 1958. Report of the Labour Investigation Committee, Main Report : 67 & 74. New Delhi : Government of India.

earlier considered tribal belts. Rural labour, particularly landless labour, has also been attracted to the construction sites or to the transport, trade and other services.

5.2.8 The drift to urban areas continues. The process of urbanisation is intimately connected without migration of manpower from rural areas. Even though a strict comparison of data thrown up by different censuses may not be possible, because of differences in the criteria adopted in defining an area as urban or rural, certain broad features are discernible. Between 1901 and 1941, the percentage of urban to total population went up by 3 points, from 10.85 per cent to 13.86 per cent; the rate of migration in the decade 1911-1921 was quite high. By 1951, the urban population formed 17.30 per cent of the total. The census in 1971 has revealed that in the last two decades the percentage has gone up further to 19.9 per cent. The rate of increase in urban population was higher than that of the total population. The data are indicative of the increasing out migration from the rural areas. This is due to lack of opportunities for employment and income in the rural areas on the one hand and lure of employment, higher income and urban facilities on the other.

Contribution to Foreign Exchange Resources

5.2.9 Agricultural products—primary produce and manufactures based thereon—occupy an important place in the country's export trade. According to one estimate¹, agricultural commodities like raw cotton and jute, unmanufactured tobacco, oilseeds, spices, tea and coffee, which used to figure in the export trade before the Second World War, accounted for about 49 per cent of the total value of exports in 1938-39. Partition reduced the agricultural resources of the country and affected the exports of jute, cotton and hides. However, even with the reduced resources, agriculture (primary products) will contribute 41 per cent of total exports in 1950-51. Although during the following two decades the diversification of India's export received attention and the share of agriculture tended to decline as a result, the reliance on these agricultural commodities has continued to be substantial. In 1973-74, the share of these commodities in the total exports was as high as 38 per cent. In value terms, however, the exports of agricultural commodities were Rs 963 crores in 1973-74 compared with Rs 237 crores in 1950-51. While the value of exports of these commodities has gone up, an increasingly large share is being accounted for by the processed commodities.

5.2.10 The contribution of agriculture to total exports will be much more if the exports of agro-based manufactures (Rs 879 crores in 1973-74) are taken into account. If the manufactures based on a few important

1. Poduval, R. N. 1952. Agricultural Commodities in India's Export Trade, Indian J. of Agri. Econ. VII(1) : 142-148.

agricultural produce, like cotton and jute, are included, it is seen that the share of agricultural commodities and the agricultural content of related manufactures and semi-manufactures was 70 per cent in 1950-51, 66 per cent in 1960-61, 50 per cent in 1970-71 and 54 per cent in 1973-74. The relevant data for these years are given in Table 5.3. During the intervening years, the share has fluctuated as a result of factors like international developments, international market conditions and unit values, internal production and demand situation.

TABLE 5.3

Share of Agricultural Commodities in Total Exports of All Merchandise+

Rs crores

Item	1950-51	1960-61	1970-71	1973-74
1. agricultural commodities raw and processed	237	283	542	963
2. agricultural content of exported manufactures*	170	133	226	385
3. all agricultural products	407	416	768	1,348
4. total-exports of all merchandise	579	632	1,524	2,518
5. 1 as percentage of 4	41	45	35	38
2 as percentage of 4	29	21	15	16
3 as percentage of 4	70	66	50	54

+1. Annual Statement of Foreign Trade of India for 1950-51 and 1951-52.

2. March Issues of Monthly Statistics of Foreign Trade of India.

*Items covered are yarn and manufactures of jute, cotton, coir fibre and wool, leather and leather manufactures and tobacco manufactures. Total exports of these commodities in 1973-74 and up to Rs 853 crores. The export values of these manufactures have been adjusted to reflect only the agricultural content.

5.2.11 Compared with exports, the importance of agricultural products in the total import trade is relatively less. For 1950-51, the share of these products in total imports was 39 per cent. In 1970-71, it was 28 per cent and in 1973-74, 24 per cent. If agricultural requisites like fertilisers and machinery are also taken into account, the shares were respectively 40 per cent, 34 per cent and 31 per cent.

TABLE 5.4

Share of Imports of Agricultural Products in Total Imports+

Rs. crores

Item	1950-51	1960-61	1970-71	1973-74
1. agricultural products of which—				
cereal & cereal preparations	243	352	446	722
2. agricultural requisites	99	181	213	473
3. total agricultural products & requisites	7	13	102	201
4. total imports*	250	365	548	923
5. 1 as percentage of 4	622	1,112	1,623	2,950
2 as percentage of 4	39	32	28	24
3 as percentage of 4	1	1	6	7
	40	33	34	31

+*Ibid.* References 1 and 2, Table 5.3.

*Excludes re-exports.

5.2.12 Food (cereal and cereal preparations) constitutes the most important item among the agricultural products imported, although much of it was obtained on concessional terms and some as gifts. In the early years of planning, the imports of raw cotton and jute were substantial in order to bridge the gap between demand and internal supplies which had dwindled as a result of Partition. In 1950-51 their share in the total imports of agricultural products and requisites was 40 per cent. However, as the indigenous production of these commodities was augmented through planned effort, their imports came down substantially and formed 18 per cent of total agricultural products and requisites imported in 1970-71 and 7 per cent in 1973-74, thereby highlighting the import substitution effect of agricultural production. Also in respect of other import items, for which the requirement is increasing, the development of indigenous capacity has resulted in a gradual decline in the proportion of imports to total supplies. This could be seen from Table 5.5. In respect of foodgrains, however, there has again been a spurt in imports during 1973-74 following shortfall in domestic production.

TABLE 5.5
Share of Imports in Total Estimated Supplies -

(a) Total estimated supplies
(b) Imports as percentage to supplies

Year	foodgrains (million tonnes)		raw cotton (Lakh bales of 180 kg each)		newsprint ('000 tonnes)		paper and paper board etc. ('000 tonnes)		ammonium sulphate ('000 tonnes)	
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
1	2	3	4	5	6	7	8	9	10	11
1950-51	60.6	5.9	39.9	27.8	76	100.0	151	23.2	423	88.9
1960-61	84.5	4.7	58.4	16.4	96	76.0	378	7.4	755	47.3
1970-71	107.2	2.8	72.8	11.1	181	79.6	770	1.9	989	16.1
1971-72	104.3	1.8	73.3	10.0	247	83.8	814	1.4	1,100	13.5
1972-73	104.3	0.8	74.4*	6.7	194	79.2	755	2.9	1,243	14.8
1973-74	102.9	4.3	69.8**	1.9	166	70.5	739	2.3	1,141	7.1

+Economic Survey, 1974-75 : 104. Government of India.

NOTES —(1) In case of raw cotton the total estimated supplies relate to the crop/agricultural years. For foodgrains total supplies have been estimated on the basis of production for agricultural years and imports on financial years.

(2) In the case of foodgrains and raw cotton the figures are three years moving average of a year before the year concerned and a year after; except for 1973-74 where the average refers to two years 1972-73 and 1973-74.

(3) Imports of ammonium sulphate relate to those imported for Central Fertiliser Pool.

(4) Due to change in source of data, the figures for 1950-51 and 1960-61 are not strictly comparable with the figures for later years.

*Partially estimated. **Estimated.

5.2.13 Both through exports and import substitution, the agricultural sector has contributed to the earning and conservation of foreign exchange, which is needed for capital and maintenance importanc for the development of the economy. This is amply borne out by the table below:

TABLE 5.6

Imports and Exports

(Rs crores)

Item	Imports			Exports			Excess of exports over imports		
	1950- 51	1970- 71	1973- 74	1950- 51	1970- 71	1973- 74	1950- 51	1970- 71	1973- 74
agricultural products & requisites*	250	548	923	407	768	1,348	(+)157	(+)220	(+)425
manufactured goods, minerals, etc.	372	1,075	2,027	172	756	1,170	(-)200	(-)319	(-)857
all merchandise	622	1,623	2,950	579	1,524	2,518	(-) 43	(-) 99	(-)432

*The agricultural content of jute yarn and manufactures, cotton yarn and manufactures, coir fibre yarn and manufactures, leather and leather manufactures, tobacco manufactures, woollen yarn and manufactures are included in this item and excluded from manufactured goods, minerals, etc. Exports of agricultural requisites are included in item 2 and not in item 1.

Traditional and Modern Agriculture

5.2.14 While agriculture held an important place in the national economy, its efficiency remained at a low level. Before Independence, it was stagnant over a long period and was impoverished. It became subsistence farming and a way of life but not an enterprise. Economic, social and institutional factors as well as lack of administrative attention contributed to this state of affairs.

5.2.15 During the post-Independence period, although the agricultural sector received much more attention, over vast areas in the country, about 75 to 80 per cent, crop production has continued to remain traditional in character. Conditions of static technology and cultural practices established over generations pervade the scene. The technology used is labour intensive and production is largely conditioned by the amount of labour the cultivator is in a position, and is prepared, to put in. Crop production is restricted to a few months in a year and is dependent on the vagaries of weather. A good proportion of inputs is farm produced and the quantity of purchased inputs is small. The seeds used are locally produced; the use of chemical fertilisers is minimum while green and farmyard manures are used to the extent available. Cultivators lack knowledge about soil and water conservation and the land management practices are inefficient. Lack of knowledge and lack of capital have resulted in the inefficient use of production resources and in low yield. Poor cultural practices resulting

in low yields have limited income and the capacity to invest, throwing the economy of the cultivator into a self perpetuating cycle of low investment and low returns. Inadequate marketing facilities conditioned the attitude of the farming community and the rate of growth of production.

5.2.16 Animal husbandry, fishery and forestry have also been practised on traditional lines. Livestock rearing till recently was not based on modern scientific lines and was geared to meet largely the needs of the farmer's family. It had hardly any market-orientation the reasons being lack of training, capital, infrastructure as well as motivation. Fish farming is not based on scientific stocking, rearing and exploitation. Modern methods of fishing are yet to be introduced on a large scale both in respect of inland and marine fisheries. Fishery industry suffers from lack of development of supporting infrastructure. Similarly, till recently the management of forestry was characterised by longer rotation, less utilisation of secondary species, inadequate investment on raising plantations and opening up inaccessible areas and on the linkages with forest based industries. The result of this approach has been low yield, which has been among the lowest in the world.

5.2.17 A modern sector has also been developing in recent years although on a very limited scale. In the areas placed favourably with respect to controlled irrigation, a new technology based on proper combinations of seed, water, fertilisers and pesticides have made farming more dynamic. Crop production on these modern lines has been possible as a result of the discovery of new varieties and hybrids which are more responsive to purchased inputs like fertilisers and give very high yields. The adoption of efficient farming methods developed through research has paid good dividends in the areas where modernisation has taken roots. As we have observed in the earlier chapter* the increases in crop production in the sixties are the result more of improvement in yield than of extension in area, as contrasted with the situation in the previous decade which witnessed increases more from extension of area. The results of a breakthrough in technology are most spectacular in the case of irrigated wheat. Also in the case of maize, the improvement in yield has been substantial if not so spectacular. In respect of rice, jowar and cotton, improved varieties and better agronomic practices have lead to increased productivity. For instance, in Ludhiana district where 85 per cent of wheat cultivation is done under irrigated conditions, the productivity has gone up from 1,336 kg per ha in 1960-61 to 3,310 kg in 1971-72. Punjab as a whole has shown a remarkable increase in the productivity of wheat during the period 1960-61 to 1970-71, the productivity per hectare having increased from 1,207 kg in 1960-61 to 2,238 kg in 1970-71 as against an all-India average of 1,307 kg in the latter year. Even in the case of rice, West Godavari has registered 45 per cent

*Chapter 3 on Progress of Agricultural Development.

increase in productivity between 1960-61 and 1971-72. Increments in productivity have been facilitated by various factors like extension in irrigated areas, better water management practices, increasing use of fertilisers and pesticides, better seeds, equipment and tools, extension services, credit facilities, etc.

5.2.18 In animal husbandry, the efforts made since the beginning of planning have resulted in genetic improvement leading to higher yields from the livestock in areas where such programmes have been implemented. The expansion of the dairy industry has given an impetus to the development and rearing of better quality cattle and buffalo for commercial exploitation. The Kaira district Cooperative Milk Producers Union Ltd. is a notable example which has stimulated milk production by the villagers for the market. Commercial poultry farming is another activity which is gaining popularity. Similarly, improvement of sheep, specially by introduction of exotic inheritance, has resulted in higher quantity and finer quality of wool and mutton. The programme of pig development by cross breeding with exotic stock has also yielded better quality and larger quantity of pork and pork products. Various measures introduced in the field of animal health have reduced the ravages of many an animal scourge. Of special significance is the marked reduction in the number of outbreaks and total mortality from rinderpest. These developments have been possible through genetic improvement of livestock, expansion of extension services including health services and the creation of the related infrastructure. In the field of forestry, there are instances where forest development has been started on modern lines for better management of the forest resources. In Cooch Behar in West Bengal, for example, natural forests, which earlier yielded a revenue of Rs 1,472 per hectare, have given a revenue of Rs 26,000 per hectare on a 40 years period from thinning only when planted with teak. The total revenue may go up to more than Rs 1 lakh at the end of the rotation period.

5.2.19 While notable success has been achieved in the areas where new technology has spread, its impact on the total crop production is not so spectacular. We have earlier mentioned that the increased crop production was the result more of extension of area in the early years of planning and of higher productivity since then. Studies have, however, shown that the trend rate of growth of crop production, even after much higher productivity has been obtained through the new technology, is not significantly different from the trend observed before the introduction of the new technology. According to a recent study¹ only about 27 to 40 per cent of the growth in foodgrains production can be explained by technical changes

¹ Hanumantha Rao, C. H. 1974. Technological Change and the Distribution of Gains in Indian Agriculture : 4-6, 12. Delhi, Institute of Economic Growth.

after mid-sixties; and in spite of these gains, there was a deceleration in the rate of growth of output of crops in the sixties (2.1 per cent per annum) compared with the rate observed in the fifties (3.3 per cent per annum). The same is true of foodgrains, although, since the midsixties, an upward trend is noticed.

5.2.20 An important result of the slow growth in foodgrains production is that there has been only a marginal improvement in the per capita availability, which is still not adequate. Insufficient development of animal husbandry has led to some decline in per capita availability of milk and meat. Similarly, the available supplies of fish are far less than the demand. Even in forestry, the current level of supply is not sufficient to meet the growing demand from woodbased industries as well as for domestic requirement.

5.2.21 Modern agriculture, in the areas where it has been adopted, has had considerable impact on the life and economic activity of the people. The farmers are more receptive to new ideas and willing to take risks. New entrepreneurship is emerging in the countryside. The returns from the application of modern technology being higher, more surpluses are available for investment and improvement. The adoption of this technology is also inducing organisational changes. New institutions have been established and agencies have been developed for ensuring services and supplies required by modern agriculture. The transfer of knowledge through extension and training facilities is improving the quality of the people and preparing them for the emerging tasks. In an otherwise stagnant rural society, these gains are no doubt substantial.

Interdependence between Agriculture and Industry

5.2.22 There is a close interdependence between agriculture and industry. This relates to (a) the supply of raw materials and inputs from agriculture to industry and *vice versa*; (b) the supply of wage goods to the industrial sector; and (c) the supply of materials for the building up of economic and social overheads in the agricultural sector; and (d) the supply of basic consumption goods to the agricultural population. The interdependence is becoming stronger as the economy is developing. The application of science and technology in agriculture induces innovations in respect of industrial products which are used for agricultural production. This results in the supply of equipment like farm machinery from industry which facilitates modernisation of agricultural technology.

5.2.23 The inter-industry table appended to the Material and Financial Balances prepared by the Planning Commission¹ throws useful light on the

¹ 1966. Material and Financial Balances, 1964-65, 1970-71 and 1975-76. New Delhi Planning Commission, Government of India.

extent of the interdependence between agriculture and industry. According to this document, in 1964-65, 51 per cent of the total production worth Rs 9,000 crores by the agricultural sector came from foodgrains, 30 per cent from other crops, 13 per cent from animal husbandry* and 3 per cent each from plantations and forestry. Out of the total agricultural production about 12.5 per cent went from agriculture to agriculture, while nearly 23 per cent was utilised by the industries; the rest went directly to final consumption. The value of agricultural inputs (Rs 2,085 crores) formed about 20.6 per cent of the total value of industrial output (Rs 10,106 crores) in that year. Similarly, the industrial sector delivered goods worth Rs. 228 crores to agriculture which is about 11 per cent of the amount sold by agriculture to industry and accounted for 2.53 per cent of the total output of the agricultural sector.

5.2.24 The intersectoral flows for the year 1964-65 indicate that the dependence of the industrial sector on agriculture was relatively much heavier compared with the agricultural sector's dependence on industry. Inputs for which agriculture has to depend on industry include fertilisers, pesticides, diesel oil, electric motor, diesel engines, pumping sets, agricultural tools and implements, tractors, power tillers, cement, oil cakes for cattle feed, veterinary medicine, etc. Petroleum products and electricity represent mainly the fuel consumption in the operation of pumps and tubewells and other agricultural machinery. Plantations also have a high content of industrial inputs covering a variety of products. Although similar data in absolute terms are not available for later years, it may be presumed that the dependence of the agricultural sector on industry has increased substantially since 1964-65 particularly with the modernisation of Indian agriculture.

5.2.25 After the introduction of the new technology the consumption of fertilisers and pesticides and the use of modern agricultural machinery have been going up. Between 1964-65 and 1973-74, the consumption of fertilisers is estimated to have gone up from about 0.8 million tonnes to 2.8 million tonnes and pesticides from about 12,000 tonnes to 45,000 tonnes. The use of pumpsets, electric and diesel, increased from about 1 million in 1965-66 to 4.2 million in 1973-74. Similarly, the number of tractor in use increased from 54,000 in 1966 to 170,000 in 1972. With the diversification of the Indian industry, it is expected that the dependence of that sector on agriculture as percentage of total industrial output declined over the years. However, the dependence continues to be substantial in respect of industries which have linkages with agricultural sector. Industries, like oil, sugar, jute and cotton textiles and tobacco rely heavily on the agricultural sector for the supply of raw material. Also raw materials required by manufacturing industries like leather and leather manufactures, woollen

*Includes fisheries.

manufactures, paper and newsprint and other woodbased industries came substantially from the agricultural sector. The Technical Note on the input and output matrix for the Fifth Five Year Plan prepared by the Planning Commission¹ gives only the estimated coefficients for agricultural output as input in other industries for the year 1973-74 at 1971-72 prices. According to this Note, the share of agriculture as inputs in the total output of gur and sugar industry is as high as 58 per cent. Agriculture's share in some other industries is 42 per cent for tea and coffee, 40 per cent for leather products, 32 per cent for vegetable oils, 35 per cent for jute textiles and 29 per cent for cotton textiles.

5.2.26 The entire industrial sector depends heavily on the supply of food from the agricultural sector. Since a sizeable part of wages of industrial workers is spent on food items, a sustained supply of food from agricultural sector is a necessary condition for stability in the industrial sector also. Shortfall in the production food and the consequent rise in prices affect the industrial wage structure through compensatory wage increases and thereby the structure of prices in the entire economy. In recent years, the impact of such shortfall on wage-price structure has been all too evident. Moreover, inefficient and uncertain production of important agricultural raw materials for industries like cotton, sugarcane and oilseeds has often led to their high prices, thereby pushing up the prices of final products of mass consumption and adversely affecting the economy of the people.

5.2.27 A substantial portion of the output in industries like cotton and jute textiles, leather goods, tea and coffee is exported. Moreover, these industries provide considerable employment in the country. Shortfall in the production of related agricultural commodities not only retards the production effort in these industries but also adversely affects the export earnings and employment.

5.2.28 New processing industries utilising agricultural raw materials are also developing in the country. Fruit canning, milk products, meat processing etc. are instances. The increased production of the related agricultural raw materials not only helps to develop processing industries but also creates export surpluses. The increased agricultural production and the development of such processing industries help to diversify employment and increased incomes. Similarly, the demand from the population in the agricultural sector for various types of consumer goods originating from the industrial sector is rising with the rise in incomes. As the economy has developed and incomes increased through higher productivity and more employment, the market for industrial goods has significantly expanded.

¹ 1973. A Technical Note on the Approach to the Fifth Plan of India, 1974-79 : 37-46 New Delhi, Planning Commission, Government of India.

In the absence of detailed data on absolute values, it has not been possible to give a comparative picture between 1964-65 and 1973-74.

5.2.29 The interdependence between agriculture and industry clearly shows that further growth in agricultural production in India, as elsewhere, is materially dependent on the rapid increase in the production of input supplying industries. This will help intensive application of modern techniques of agricultural production. Seeds apart, none of the new inputs needed for agricultural production is produced by the agricultural sector itself. Construction material for irrigation, road and bridges, electric motors and pumps and fertilisers and pesticides are to be obtained from outside the agricultural sector if agricultural production has to be increased and sustained at high levels. Imports of certain crucial inputs like fertilisers may have to be continued for some time to come till the indigenous capacity is sufficient.

Capital Formation in Agriculture

5.2.30 The pace of development is largely conditioned by the rate at which production assets are created in the economy. Before Independence, the capital formation in Indian agriculture was of a low order. As we have mentioned earlier, agriculture during this period suffered from constant low yield technology, inequitable land tenure system and exploitation of the rural masses. It is hardly surprising, therefore, that there was no inclination nor the capacity to create productive assets on a large scale. The capital that used to be created was largely through the personal labour of the cultivator. The capital formation included land development, construction of farm houses etc. However, since Independence, much more investment both public and private, has been made in agriculture. The creation of physical assets has generally taken the form of land development, construction of irrigation facilities, roads and communications, farm buildings, agricultural machinery and equipment, warehouses, cold storages, market yards, etc.

5.2.31 Adequate and generally acceptable data are not available regarding the total capital formation in agriculture in the country. The data on capital formation published by the Central Statistical Organisation do not provide information separately for agricultural sector as a whole. However, the All-India Rural Credit Survey conducted by the Reserve Bank of India in 1951-52 and the follow-up surveys in 1956-57 and 1959-60 give cross-section data with regard to the expenditure of farm households which have a bearing on capital formation. The National Sample Survey had also collected similar data in some of their survey rounds. Some information has also been given by the All India Rural Debt and Investment Survey and Farm Management Studies. Relying on the data of the All India Rural Credit Survey, the National Council of Applied Economic Research estimated that the net investment in agriculture was about Rs 132 crores in 1951 and about

Rs 150 crores in 1961-62. Using the data provided by the All India Rural Debt and Investment Survey, some have tried to estimate the value of tangible wealth in different sectors.¹ According to their estimate, the total tangible wealth of the country increased at current prices by 54 per cent from about Rs 67,900 crores in 1960-61 to Rs 1,04,500 crores in 1965-66. These estimates do not include the value of tangible wealth in forestry, as, according to them, there were difficulties in arriving at any comparable estimates. Of this, the total reproducible tangible wealth accounted for 68.6 per cent in 1960-61 and 70 per cent in 1965-66. Agriculture and allied activities constituted 11.1 and 11.5 per cent in the respective years. Although certain micro level studies provide information about capital formation in the respective areas, the data are not adequate enough to draw any conclusions which would be applicable to the entire country. These studies, however, indicate certain broad features about capital formation in the agricultural sector. They reveal that capital formation in the public sector has become more predominant compared to that in the private sector. This is in contrast with the situation in the pre-planning period. Private sector investment was more than the public sector investment then, although in absolute terms none was significant.

5.2.32 As development gained momentum in the country, there was more emphasis on the creation of productive assets in agriculture particularly in areas which had been exposed to new technology. Public investment formed a sizeable portion of the total investment in agriculture. During the four Plan periods, public investment worth about Rs 5,800 crores was envisaged in agriculture and irrigation. Likewise, private investment was also expected to be more than Rs 3,000 crores. The Planwise details are given in Table 5.7. It will be clear that during the post-Independence period, public investment in agriculture and irrigation has been playing a dominant role.

TABLE 5.7
Investment in Agriculture and Irrigation during Five Year Plans

		Public	Private
First Plan ¹	674	N.A.	
Second Plan ²	630	625	
Third Plan ³	1,310	800	
Fourth Plan ³	3,191	1,600	

1 Balakrishna R., 1955. Investment in Public Sector, in : Second Five Year Plan—Basic Considerations relating to Plan. Framework : 150, New Delhi Planning Commission, Government of India.

2 Third Five Year Plan : 59, New Delhi, Planning Commission, Government of India.

3. Fourth Five Year Plan : 52-54. New Delhi, Planning Commission, Government of India.

NOTE : Estimates on similar lines are not available for the Annual Plan years (1966-69).

1 Gothoskar, S. P. and Kirpa Shankar, 1972. Estimates of Tangible Wealth of India Reserve Bank of India Bulletin. XXVI (10) : 1718-1748.

5.2.33 In areas where agricultural practices are traditional, investment has also been on traditional lines like land and its improvement, tools and implements, farm structures, livestock, carts etc. But the pattern of investment in progressive areas, where modern technology has been adopted, has been predominantly in irrigation, land improvements, farm machinery, storage godowns and other infrastructures. Both variable and fixed capital in the latter areas are, therefore, of a different order—in variety as well as in quantum—since substantial amounts of capital are required for the various infrastructures and inputs to stimulate growth. A few illustrative examples are given below to indicate growth in assets between 1945 and 1972:

TABLE 5.8
Growth of Selected Farm Assets +

(Number in '000)

Item/Year	1945	1951	1961	1966	1972 (Provisional)
carts	8,483	9,861	12,072	12,695	12,960
ploughs :					
wooden	27,306	31,796	38,372	39,880	44,654
iron	481	931	2,298	3,521	
oil engines with					
pumps	12	82	230	471	1,628
electric pumps	9	26	160	415	1,618
tractors	5	9	31	54	170

+Livestock Censuses : 1945, 1951, 1961, 1966 and 1972.

5.2.34 Capital accumulation in money terms takes place through forced and voluntary savings. To induce forced saving the mechanism of direct and indirect taxation has been used. The transfer of resources through indirect taxes on various goods has been substantial. The direct taxes on agricultural population are, however, not heavy. Voluntary saving in commercial banks is also indicative of accumulation of capital which can be used for investment. As mentioned in the Report of the All India Rural Credit Review Committee¹, part of the deposits mobilised by the banks in rural and semi-urban areas was transferred to urban centres. At the end of 1965, total advances by banks in rural and semi-urban areas amounted to Rs 114 crores against a total deposit mobilised at Rs 262 crores, implying a transfer of about 56 per cent of the deposits to urban areas. The deposits with the banks in rural and semi-urban areas have substantially increased since then. It is also seen that the transfer of resources from these areas to urban areas is sizable. Although the amount of deposits redeployed in rural areas seems to have increased

¹ 1969. Report of the All India Rural Credit Review Committee : 332, Bombay, Reserve Bank of India.

between 1969 and 1973, it is generally felt that this was inadequate considering the needs of the rural areas, particularly agriculture.

TABLE 5.9

Deposits and Advances of Scheduled Commercial Banks in Rural and Semi-Urban Centres+

Centre	As on last Friday of June 1969			June 1973		
	deposits	advances	advances deposit ratio	deposits	advances	advances deposit ratio
	(Rs crores)			(Rs crores)		
1. rural	145	54	37.24	654	308	47.09
2. semi-urban	1,024	407	39.75	2,130	914	42.91
3. total (1+2)	1,169	461	39.44	2,784	1,222	43.89

+Report on Currency & Finance, 1973-74 : 113. Bombay, Reserve Bank of India.

5.2.35 This brief review has highlighted that agriculture occupies a central place in the national economy at the current stage of the country's development. Its performance has set the pace of growth of the economy as a whole. However, the experience during the post-Independence period bears out that the growth rate in agriculture could hardly keep pace with the population growth and the requirements of the economy. In fact, the agricultural sector grew at a rate much below its potential. Even the impact of new technology has not been sufficient to alter significantly the trend rate of growth in crop production. The rapid growth of population on the one hand and the inadequate growth of agriculture on the other, have led to several unwelcome developments. The per capita availability of food-grains has registered only a marginal increase while that of milk and meat has actually declined. The prices of agricultural products have gone up with rising demand, particularly in bad years, thereby setting off a chain reaction and imposing hardship on the masses. The growth in rural incomes has been sluggish thereby increasing the disparity between rural and urban incomes. Lack of adequate growth has increased the pressure on land and led to the mounting rural underemployment and unemployment.

5.2.36 Variation in crop production had important effect on the budgetary position of the Government and the general price level. Whenever there was setback due to natural calamities tremendous burden was imposed on the budgetary resources of both Central and State Governments for relief. "As against an annual average of expenditure of Rs 13.41 crores during the period of the Third Plan, expenditure under '64-Famine Relief' in State budgets rose to an average of Rs 81.01 crores during the period of three annual plans..... The expenditure which

stood at Rs 151.87 crores in 1969-70 rose to an all time peak of Rs 318 crores in 1972-73. Central assistance to the States for financing such expenditure has also registered an equally disturbing increase In fact Central assistance to some States for drought relief has far exceeded the assistance for the Plan."¹ Compared with the Central assistance of about Rs 90 crores during 1965-67 for relief from natural calamities, it stood at about Rs 217 crores in 1972-73. For the 9-year period ending 1973-74, the total Central assistance to States towards natural calamities relief expenditure amounted to about Rs 1,104 crores.

5.2.37 Shortfall in production created imbalance between demand and supply and prices went up. Since agricultural commodities have a large weightage in the indices of wholesale and consumer prices, steep rise in their prices affected every sphere of the economy, thereby disturbing the stability so very necessary for planned development. The entire planning process had been impaired twice, once in the sixties and then in the seventies, due to sharp rise in prices. Setbacks in agricultural production were one of major factors which resulted in this situation. Investments had to be cut back while their real value declined; the growth of the economy as a result suffered.

5.2.38 As agricultural incomes failed to grow, or even declined, following shortfalls in production, it affected not only capital formation in agriculture but also growth in industry. Lack of purchasing power among the rural population reduced the demand for various industrial goods, thus limiting the growth of the industrial sector. Moreover, when agricultural production suffers, massive imports of food and raw materials become necessary, entailing a severe drain on the country's meagre foreign exchange resources. As indicated earlier, the inadequate growth in food production resulted in food imports which constituted a sizable proportion of the total agricultural imports. Between 1950-51 and 1973-74 Rs 4,924 crores worth of food imports were necessary to meet the demand-supply gap.

5.2.39 It is necessary to point out further that the declining share of agriculture in the total output of the country does not reflect a significant structural transformation of the economy. This is unlike the experience of developed countries. The decline has not taken place after a reasonably sound agricultural base has been laid. Not only had there been no significant change in the percentage of labour force dependent on agriculture; but in absolute terms, the number has increased substantially. In the process of economic development, the gradual decline in the share of agriculture relative to other sectors is expected. But such decline would be meaningful after the potential of the agricultural sector has been more fully exploited.

¹ 1973. Report of the Finance Commission : 63. New Delhi., Government of India. 3-131 Deptt. of Agri./76

3 ROLE OF AGRICULTURE IN THE FUTURE

5.3.1 A strong foundation of agriculture is a necessary condition for sustained and rapid economic and social development in India. Without this, it will be impossible to accelerate growth and ensure sustained improvement of the economy of the people. Agriculture can contribute substantially to the improvement of the rural as well as the overall economy and has the potential to become the leading sector in development. We, therefore, envisage a more dynamic role for this sector in the future.

5.3.2 In dealing with the problems of growth and development of the Indian economy, the main focus will have to be on the rural sector. The compulsions of agricultural development are strikingly revealed by the population dynamics. According to the projections, the population of India is estimated to go up from 550.7 million in 1971 to about 935 million in 2000 AD, i.e. by about 70 per cent. Although the rural population is likely to come down from about 80 to 71 per cent of the total population, in absolute numbers it is expected to increase by about 222 million during this period.* The urban population, on the other hand, is estimated to swell to about 273 million—an addition of 163 million—forming about 29 per cent of the total population. The absorption of the additional labour force in the urban areas will itself pose a serious problem. The rate at which industrialisation is taking place in the country and its pattern do not promise any significant structural transformation and large scale transfer of population from rural to urban activities. The rural economy, in the circumstances, will be required to support a vast population. Even after the rural non-agricultural activities, which substantially depend on the prosperity of agriculture, are diversified, it seems the absolute number dependent on agriculture will, in fact, be much higher than at present.

5.3.3 This is the magnitude of the problem that the country has to face by the turn of the century. The responsibility of the agricultural sector in providing food and nutrition, industrial raw materials, employment, capital and exchange earnings can therefore, hardly be overemphasised. The supply of food not only for the rural population but also for the growing urban population will pose stupendous problems in future years. Even to maintain the present levels of inadequate intake, food production has to be stepped up significantly.

5.3.4 Adequate production of foodgrains as well as supplementary protective foods are necessary for improving the diet and thereby nutrition. The productivity of labour can improve only when the human capital is endowed with health and vigour. There is vast scope for stepping up the

*The basis of these estimates is given in Chapter 10 on Demand Projections.

production of protective foods from the present low-levels. Through the adequacy of food, both in quantity and quality, the capacity to work and earn can substantially improve, thereby resulting in increased production, welfare and happiness, which is the goal of development. Inadequacy of food and malnutrition can seriously impair productive effort and hold down development.

5.3.5 In the future, greater and planned efforts will be made to expand wage employment through both industrial and urban job creation and employment programmes in rural areas for building infrastructures and off farm facilities to absorb the growing labour force. It will thus be necessary to generate a large surplus of wage goods for their sustained supply to the working population at reasonable and stable prices so that there is sufficient economic stability for planned development. Agricultural growth assumes critical importance in this development process in a country like India where a very large proportion of commodity consumption comprises agricultural products and manufactures based on agricultural raw materials. As population and income grow, the demand for these products will rise rapidly. The commodity demand projections made later in Chapter 10 of this Report indicate substantial increases during the next 25 years. For instance, even on the assumption of low estimates of income growth, the aggregate domestic demand for foodgrains is expected to go up by 90 per cent over 1971, sugar and gur by about 109 per cent, oils about 160 per cent, milk about 127 per cent, eggs 188 per cent and fish almost 161 per cent by the turn of the century. Similarly, the demand for cotton clothing is expected to go up to about 15.5 thousand million metres—and increase of more than two and a half times over the consumption in 1961. These instances provide an idea of the dimension of the demands expected to be made on the agricultural sector as development proceeds.

5.3.6 Apart from imparting stability to the economy, the achievement of self-sufficiency, both in foodgrains and important cash crops, would help the country in other important ways. Firstly, it would eliminate the burden on foreign exchange resources imposed as a result of the need for imports to bridge the gap between demand and internal supply. Secondly, exchange resources so released can be utilised for the import of capital goods and raw materials to accelerate the growth of other sectors of the economy. Thirdly, it would considerably reduce the uncertainties generally associated with the procurement of supplies from international sources and their adverse impact on internal availability, prices and the economy as a whole. The trend of behaviour of the international markets does not hold promise that the uncertainties will be less in future.

5.3.7 Important industries, like cotton and jute textiles, leather and leather products, dairy products, vegetable oils, tea, coffee, paper and

other woodbased products, depend for their raw material supply on the production performance in the agricultural sector. Conservative estimates of increase in demand indicate that by 2000 AD, the requirement of cotton for clothing will increase by about 76 per cent, jute by about 258 per cent, tea by about 137 per cent and coffee by 173 per cent over the demand in 1971. The expansion and utilisation of the capacity in these and other similar industries would depend on the internal availability of the raw materials since large imports are ruled out for want of foreign exchange. It is obvious that internal production of the agricultural raw materials would have to be augmented substantially if imports are to be avoided and uninterrupted functioning of these important industries is to be ensured.

5.3.8 Increases in the production of crops are dependent on the use of land augmenting technology and non-farm inputs like fertilisers, which increase the factor productivity. The rapid expansion of irrigation facilities will enable the cultivators to put large areas under multiple cropping. But there are limits to which irrigation can be extended. As we shall see later in Chapter 15, irrigation, which helps to obtain greater yield per hectare and thereby total output, can at best cover about 42 per cent of the cropped area by 2000 A.D. While every effort has to be made to secure maximum productivity from the areas where expensive infrastructures of irrigation are created, it would be necessary to obtain large production from the rainfed areas to augment the total supplies. Improved technology and land utilisation can turn into better use the natural endowments in these areas. It is possible to develop suitable cropping systems on the basis of analysis of meteorological data. Later in Chapter 14 on Rainfall and Cropping patterns, we have indicated the lines on which regions based on rainfall and cropping patterns could be identified and the principles governing the determination of appropriate cropping pattern for each region. The adoption of these patterns along with soil and moisture conservation and more efficient agronomic practices will not only reduce the variability but also enhance production substantially by making better use of the natural resources. Although the returns may not be as high as in irrigated areas they are likely to be substantial to warrant investment in infrastructures and improvements. Moreover, while ensuring large production, agricultural development has to be so planned as to lead to greater ecological and environmental balance and preservation of the non-reproducible wealth of the country like the conservative, as opposed to the exploitative, use of soil.

5.3.9. More attention to the development of horticulture, animal husbandry and fisheries will result in larger availability of protective foods. As the improvement of nutrition is a basic aim of development, increased

production in these fields assumes particular importance. Moreover, as the economy grows and incomes rise, consumer preferences will be for higher quality foods which the products of horticulture, animal husbandry and fisheries can provide. The availability in sufficient quantities and at reasonable prices will result in higher consumption of these and less dependence on cereals. Also agro-climatic conditions in many areas do not make crop production advantageous. Some areas are specially suitable for horticulture, some for animal husbandry and so on.

5.3.10 Welfare is the ultimate goal of development. In deciding upon the pattern of development, care has to be taken that imbalances do not develop, as in the past, and the benefits of development are widely shared. If the right pattern is chosen and appropriate supporting institutions and infrastructures are brought about, the growth of agriculture can lessen the widening disparities among different classes of the rural population, different regions as well as between rural and urban areas by creating dispersed productive employment and facilitating better income distribution. We shall discuss this aspect of distributive equity in greater detail in Chapter 6 on Growth with Social Justice.

5.3.11 Even after deliberate effort are made to expand non-agricultural activities in the rural areas during the next 25 years, as we shall explain in Chapter 58 on Rural Employment, agricultural sector of necessity has to be developed in a manner so as to absorb a large proportion of the increase in population in the rural sector and provide the labour force with gainful occupation and reasonable sustenance. Moreover, agriculture has to provide employment to the vast number of the existing underemployed and unemployed. Experience has shown that if cultivation is done on scientific lines, it can substantially augment labour requirement, particularly so in irrigated areas where intensity of cropping can be increased. Soil conservation and land improvements can also add to labour needs. But since production of field crops alone may not provide full-time employment to the entire labour force, particularly small farmers, marginal farmers and agricultural labourers, the accent on horticulture, poultry, pig, sheep and dairy farming and fisheries will have to be much more than before. All these are labour intensive activities. The scope for increasing economic activities on these lines also seems to be immense. The income elasticity of demand for horticultural, livestock, poultry and fishery products being relatively high compared to cereals, these activities may not suffer from demand constraints as incomes rise with the development of the economy. Production of these types of commodities, apart from benefiting the population, will give the agricultural population additional benefits of better nutrition, less underemployment and more income. Similarly, forestry activities—production forestry, social forestry as well as the development of minor forest produce—can lead to much larger employment.

5.3.12 The expansion in the demand for processed and higher quality food items creates secondary and tertiary employment as processing, packaging, marketing and market promotion efforts like advertising develop. The experience of more developed countries show that a large proportion of the ultimate consumer price of these products is accounted for by the activities in the secondary and tertiary sectors. As incomes increase in this country also, the demand for such products may be expected to rise, thereby stimulating activities in secondary and tertiary sectors and creating additional employment opportunities. Similarly, when forest development is linked with industrial utilisation of forest products, employment generated in transportation and industrial processing may be substantial.

5.3.13 The positive nature of the interaction between agriculture and industry will stimulate and reinforce the development of both agricultural and industrial sectors. The agricultural sector to develop on modern lines will need much more purchased inputs than before. We have seen that the growth which has taken place so far has increased the dependence of the agricultural sector on industry. While the agricultural sector is geared up to produce adequate quantities of food and raw materials for the industrial sector, the expansion of industrial activity will increase demands for agricultural products and thereby augment employment and incomes of the agricultural population. The increased incomes in the agricultural sector will create the market for consumption goods supplied by the industrial sector and stimulate the growth of industries. Lack of growth and, therefore, lack of purchasing power among the vast agricultural population, would result in stagnation of demand and hinder growth itself.

5.3.14 Agricultural development will need the creation of economic and social overheads in the form of irrigation facilities, roads and transportation, electrification, markets, etc. The construction of these overheads has substantial employment potential and can be taken up as important employment programmes. Further, acceleration of these activities will generate considerable demand for construction materials and give an impetus to the development of industry and transport. The adoption of scientific cropping patterns and the development of various agricultural activities in different regions would create new centres of production and generate demands for processing, storage, marketing and transport services as all-round production increases take place. The creation of these overheads and facilities will aid the process of growth of the economy as a whole through both backward and forward linkages and generate substantial off farm employment potential.

5.3.15 In spite of the fact that the exports of primary produce have to face uncertain international markets, in the early stages of development reliance has to be put on these exports to earn sufficient foreign exchange.

This is because the industrial sector is not so developed and diversified as to ensure through exports the surplus of foreign exchange necessary for the import of capital goods and raw materials for further development. In Chapter 12 on Export Possibilities and Import Substitution, we have examined the export potential of agricultural commodities. Here we may only mention that apart from the traditional agricultural items, potential exists for the export of several other agricultural products including processed items like leather and leather products, processed meat, marine products, fresh and canned fruits, cotton textiles, handloom and silk, spices, etc. The accent could be shifted gradually from primary produce to processed agricultural products and agro based manufacture to realise higher exchange value per unit of exports and to create employment in the country.

5.3.16 As agricultural production improves and gets diversified, it will make significant contributions to net exchange earning, by reducing current and eliminating or minimising potential agricultural imports and by expanding agricultural exports, both raw and processed. Food alone constitutes a large proportion of current agricultural imports. Self-sufficiency in food, animal husbandry products and important raw materials will result in substantial savings in foreign exchange.

5.3.17 The modernisation and improvement of agriculture will need considerable capital for investment as well as current expenditure. The construction of irrigation projects and command area development requires substantial capital investment. So also the creation of other economic and social overheads. Processing, storage and marketing facilities not only for crops but also for the products of animal husbandry horticulture and fisheries require substantial investment. Commercial development of forestry also needs considerable investment. Input costs of modern agriculture, moreover, are high. Surpluses have to be created within agriculture itself to increase savings and enable investment. The non-agricultural sectors can hardly provide the capital required for the development of the agricultural sector.

5.3.18 The creation of enough surpluses in the agricultural sector is, therefore, necessary for economic development. The modernisation and technological improvements will increase agricultural productivity and generate surpluses for capital accumulation, both real and monetary. The creation of physical assets in the agricultural sector apart, the generation of surpluses increases saving potential which would facilitate mobilisation of resources through direct and indirect taxation as well as through banks. However, the transfer of resources to non-agricultural sectors should be so regulated as not to trench the capital needs of agriculture.

5.3.19 Factor productivity can be substantially increased through

institutional and organisational changes and improvement of managerial and labour skills. A suitably planned network of cooperatives and other agencies has to develop for providing supplies and services to the agricultural community. To sustain and imporve agricultural production, reserach facilities have to be expanded. The transfer of research results and improved technology will call for an expanded and efficient extension agency. Education and training facilities will require to be enlarged and geared adequately for the development of human resources. Agricultural development, it will be clear, will lead to all such non-farm activities expanding the scope for employment and development of expertise.

5.3.20 In indicating the role of agriculture in the development of the the country's economy in the future, we have stressed on the compulsions of agricultural development. We should like to emphasize that the agricultural sector has to grow at a rate much faster than before not only for its own sake but for the sake of the economy as a whole. It has a large potential to contribute to the national income while at the same time provide direct employment and income to the numerically larger and vulnerable sections of the society. In formulating the future policies and strategies of development of agricultural as well as national economy, these considerations should be kept in view.

APPENDIX 5.1
Estimates of National Income of India+

(Paragraph 5.2.1)

Estimate by	Year	total income in Rs abja*	per capital income Rs	contribution of agriculture		coverage
				in Rs	P.C. abja*	
1	2	3	4	5	6	7
1. Dadabhai Naoroji	1867-68	3.4	20	2.6	77	For most of British India
2. Baring-Barbour	1882	5.3	27	3.5	67	For British India—all non-agricultural income assumed to be half of agricultural income.
3. Curzon . . .	1897-98	6.7	30	4.5	67	Do.
4. W. Digby . .	1898-99	4.3	18	2.8	67	For British India.
5. F. J. Atkinson .	1895	8.8	39.5	5.6	63	For British India
6. Wadia and Joshi	1913-14	12.1	44	8.6	70	For British India
7. Vakil and Muranjan	1910-14	17.7	58.5	11.1	64	For the whole of India
8. Findlay Shirras	1921	26.0	107	17.1	66	For British India
9. Shah and Khambatta	1921-22	23.6	74	21.0	89	For the whole of India
10. V. K. R. V. Rao.	1925-29	23.0	78	12.9	57	For British India
	1931-32	16.9	62	9.0	53	For British India.
11. R. C. Desai .	1931-32	28.1	82.5	—	62	For the whole of India
12. Ministry of Commerce	1945-46	62.3	198	27.4	44	For British India
13. Central Statistical Organisation	1948-49	86.7	247	42.5	49	For Indian Union.
	1950-51	95.5	246	48.9	51	
	1952-53	98.3	257	49.0	50	
	1954-55	96.2	272	43.5	45	

*abja=100 crores = 109

+ *Ibid.*, 1 (p. 2) : 4

6

GROWTH WITH SOCIAL JUSTICE

1 INTRODUCTION

6.1.1 The Government Resolution constituting the National Commission on Agriculture underscores the need to ensure that "the development of agriculture caters to the welfare of the vast multitude of population living in the rural areas". It lays stress on social justice and equality of opportunity as important considerations in the development strategy. The Resolution requires the Commission to indicate measures which would secure effective participation of the bulk of the Indian peasantry in stepping up agricultural production and ensure that the benefits of the new technology are widely shared instead of being limited to the better-off class of farmers only.

6.1.2 The imperative need for these considerations arises from the deficiencies in the rural socio-economic set-up and the widespread poverty. The process of development has so far touched only a small fraction of the rural population and that too only in limited areas. Extensive areas and a vast rural population are still outside this process. The growing population, therefore, sees little employment opportunities and scope to earn a reasonable living and faces the spectre of hunger, malnutrition and incapacity. The inequitable land relations, institutional inadequacies and lack of infrastructure are all factors which are contributing to the widening of disparities between classes of rural population and also between regions. These tendencies have grave implications in terms of economic stability and social cohesion.

6.1.3 Wide disparity in income distribution and levels of living and the prevalence of extensive poverty are incompatible with the economic, social and political goals the country has set before it. The dualistic structure in the agricultural economy is not conducive to the establishment of an egalitarian society. Its continuance will impede growth and defeat the very purpose of development.

6.1.4 In the ultimate analysis, the aim of development is to improve the economic, social and cultural well-being of the people. The objective of agricultural development should be to not merely raise agricultural production and productivity but also create conditions for economic, social and

cultural improvement through equality of opportunity and more equitable distribution of income and wealth. This is possible if opportunities for gainful employment are substantially expanded for the bulk of the rural population and the conditions of self-employment considerably improved. Such an approach to agricultural development needs a clear recognition of social objectives and priorities. It implies that social justice should be the underlying principle of agricultural development policy and must be given a central place in the future pattern of rural economic development. Strategies should accordingly be formulated for the establishment of an egalitarian rural economy.

6.1.5 Within the frame work of such a policy, measures will have to be devised to tackle the problem of disparate development not only among classes of rural population but also among the regions with varying endowments. Given their peculiar economic, social and cultural conditions, the hill areas, desert areas and tribal areas in the country need special attention to promote balanced growth and development. Further, the problems due to widening disparity between rural and urban areas require special attention in the formulation of the future policy of agricultural and rural development. Agricultural development should indeed be the means of bringing about the desired transformation in rural life and society. Such a policy and strategies for promoting growth with social justice will create conditions for not only social harmony but also political stability.

2 POVERTY

Problem of Rural Poverty

6.2.1 Despite the measures for development of agriculture during the last 25 years, no appreciable dent has been made on the poverty and disparities. Low per capita income and highly skewed income distribution continue. Poverty level has been defined in terms of certain minimum level of consumption and elimination of poverty presupposes implementation of measures which enable those below the level to have access to this minimum. A Study Group appointed in 1962 by the Government of India recommended a per capita consumption of Rs 20 per month at 1960-61 prices (excluding expenditure on health and education), as the national minimum level.¹ At 1972-73 prices, the corresponding amount would be about Rs 40-60.² Various studies have been made to estimate the number

1 Dandekar, V. M. and Nilakantha Rath, 1971. Poverty in India : 8 Economic and Political Weekly, Bombay for Indian School of Political Economy.

2 1973. Draft Fifth Five Year Plan 1974-79, Vol. I : 8. New Delhi, Planning Commission, Government of India.

of persons whose consumption has remained below the minimum desirable level. Although these estimates differ with regard to the magnitude of rural poverty, there is agreement that in absolute terms the number involved is staggering. Dandekar and Rath have shown in their study "Poverty in India" that in 1960-61, per capita monthly expenditure of Rs 15 in the rural areas and Rs 22.50 in the urban areas would have been adequate to provide food which gives 2,250 calories a day. Thus, in terms of nutritional adequacy, about 40 per cent of the rural population and about 50 per cent of the urban population lived below the desirable minimum levels of living in 1960-61.¹ According to another estimate,² "if the national average of per capita consumption is taken as an aspiration norm, 69.25 per cent of the people in rural India in 1960-61 had consumer expenditure below the average for the rural areas (Rs 21.47 per person per month). In urban areas, 71.53 per cent of the people lived below the average urban consumer expenditure of Rs 40 per month." The corresponding percentage of people living below the respective averages of per capita monthly consumer expenditure in 1968-69, according to this estimate, would be approximately 68 for rural areas and 72 for urban areas. This estimate shows a slight decline in the percentage of population below the aspiration norm in rural areas but a nominal increase in urban areas. In absolute number, however, rural population below the norm increased from about 247 million in 1960-61 to about 284 million in 1968-69, thus adding 37 million people in this category during a span of 8 years. Even if the norms used by Dandekar and Rath are taken into consideration and applied to the rural consumption expenditure data of 1968-69, about 45 per cent of the rural population was below the poverty line in that year. In absolute terms, it means an increase of about 45 million during the same eight-year period.

6.2.2 Another significant fact is the phenomenal increase in the ranks of agricultural labourers during the decade 1961-1971. A comparison³ of the number of agricultural workers between the 1961 and 1971 censuses, duly adjusted for differences in concepts, has revealed that while the number of agricultural workers has gone up from 124.7 million to 130.0 million, the number of agricultural labourers has increased from 27.1 million to 47.5 million during the inter-censal period. The number of cultivators, on the other hand, has decreased during the same period (1961-71) from 93.2 million to 78.2 million. Considering the extremely inadequate job

1 *Ibid.*, 1(p. 29): 3, 6

2 Dantwala, M. L., 1973. *Poverty in India—Then and Now 1870-1970* : 20-21. Bombay, Macmillan India.

3 1971. *Census of India, Series—I—India, Miscellaneous Studies, Paper I of 1974—Report on Re-Survey of Economic Questions. Some Results: Table 8*. New Delhi, Office of the Registrar General and Census Commissioner of India.

opportunities and the increased number of persons without land holdings, it can be expected that there has been a general accentuation of poverty in the rural areas.

6.2.3 The Twentyfifth Round of the National Sample Survey¹, which has studied the economic conditions of the weaker sections of the population in rural areas, has also brought out the glaring poverty that exists in the countryside. This will be evident from the table below :—

TABLE 6.1
Percentage Distribution of Estimated Number of Households (Weaker Sections)
by Monthly Per Capita Expenditure Class

Monthly per capita expenditure class (Rs)	Small cultivator households		Non-cultivating wage households	
	Percentage	Cumulative Percentage	Percentage	Cumulative Percentage
1	2	3	4	5
0-8	0.47	0.47	0.67	0.67
8-11	2.03	2.50	1.88	2.55
11-13	3.53	6.03	3.13	5.68
13-15	4.72	10.75	4.94	10.62
15-18	8.92	19.67	8.87	19.49
18-21	11.25	30.92	11.52	31.01
21-24	11.48	42.40	11.39	42.40
24-28	13.80	56.20	12.77	55.17
28-34	16.13	72.33	16.05	71.22
34-43	12.86	85.19	13.68	84.90
43-55	8.41	93.60	7.12	92.02
55-75	4.44	98.04	5.25	97.27
75 & above	1.96	100.00	2.73	100.00
all classes	100.00		100.00	

6.2.4 The magnitude of the problem of poverty has been highlighted in the Draft Fifth Five Year Plan. According to this document, the share of the bottom 30 per cent of the population in 1973-74 has been estimated to be 13.46 per cent of the total private consumption. If this share has to remain unchanged, the average per capita consumption of the bottom 30 per cent would have to go up from Rs 25 per month (at 1972-73 prices) in 1973-74 to Rs 29 in 1978-79, Rs 35 in 1983-84 and Rs 38 in 1985-86. Even in mid-eighties, therefore, the per capita consumption for this segment of population would be below the norm of Rs 40.60 per month at 1972-73 prices. It has also been estimated that if the private consumption of the bottom 30 per cent is to be lifted to the minimum level by 1978-79,

¹ 1975. National Sample Survey. Twentyfifth Round, July 1970--June 1971, Draft Report No. 257. Consumer Expenditure of the Weaker Section of the Rural Population of India. New Delhi, National Sample Survey Organisation, Government of India.

their share in total private consumption would have to be raised from 13.46 per cent to 18.85 per cent. If the removal of poverty is sought by 1983-84, the share should require to be increased to 15.64 per cent. If 1985-86 is taken as the target date, the share would need to be about 14.44 per cent.¹

Poverty and Planning

6.2.5 From the beginning of the planning era, welfare of the society through improvement in living standards of the people has been the main objective of development. Successive five year plans have emphasised development policies in this respect. During the First Five Year Plan, the Community Development Programme was taken up on the basic premise that the overall development of rural India could be brought about only with the effective participation and, to the extent possible, the initiative of the people backed by technical and other services necessary for securing the best from such initiative and self-help. The Second Five Year Plan recognised that the benefits of economic development must accrue more and more to the relatively less privileged classes of the society. The Third Plan also emphasised the need for a sizable increase in national income so as to raise the levels of living in the country and reduce inequalities in income and wealth. In all these plans, the accent was on overall growth; programmes were not specifically designed for the removal of poverty. Due to a greater awareness of the very low levels of consumption of the poor there was recognition, in the Fourth Plan, of the need for special efforts to alter the existing pattern of income distribution. Separate schemes were initiated for the development of backward areas and the weaker sections. In the Fifth Plan removal of poverty has become a primary consideration for formulating programmes.

6.2.6 The community development movement had both economic and social goals. Agricultural development was intended to be one of the principal programmes to be undertaken. The movement was expected to facilitate the creation of necessary organisations and institutions and bring about the required motivation. Experience has, however, shown that the community development organisation largely failed to respond to the specific tasks assigned to it in the field of agricultural development. Its attention was devoted to other more ostentatious fields. A further criticism against the performance of the Community Development Programme is that whatever services were provided went largely to the more affluent sections of the rural community. The organisation did not succeed in reaching out to the rural poor.

6.2.7 In the case of the Intensive Agricultural District Programme (IADP), which was taken up in 1960-61, the structure adopted was different

¹ *Ibid.*, 2 (p. 29)

from that of the community development organisation. But the experience in the IADP areas also bears out that overall improvement in agricultural productivity does not automatically add to the well-being of every section of the community. In these areas of intensive development, the poorer sections of the farmers have largely been left out. This has resulted in widening disparities even in these pockets of agricultural growth.

Causes of Rural Poverty

6.2.8 One of the principal causes of rural poverty is the low productivity of land and labour. The low productivity of land is characterised by low-input low-output situation. The less advantaged cultivating population is still to be brought within the network of information, services and supplies which would enable them to break away from the outmoded low yield agriculture and put them on higher level of technology and of output per unit of land. The depressingly low levels of consumption among the weaker sections of the rural areas, which result from low productivity and low income, have deleterious effect on labour efficiency, which is reflected in the lack of willingness to exert and ability to work hard.

6.2.9 Apart from low productivity of land, an important cause of poverty in rural areas is the lack of land resources. A large number of households have either no land at all or only tiny pieces. They live by the personal labour of their members and constitute some of the poorest sections of the rural population. In a traditional society, ownership of land largely determines the economic opportunity available to an individual. The structure of services and supplies is built around land. Therefore, the manner in which land is distributed has more or less been the decisive factor in determining income levels among the farmers and their ability to benefit from new economic opportunities. Further, in a rural community the operations of non-farm groups are ancillary to those who hold land. Except where opportunity for non-agricultural employment exists, groups such as landless labourers, rural artisans and tenant cultivators depend for their living on the levels of production attained on land.

6.2.10 Rural development so far has failed to create enough opportunities for productive employment to absorb the growing labour force. High rates of population growth and the absence of any scope to absorb a share of this growth in urban-based activities have made matters worse. As a result, unemployment and underemployment have assumed serious proportions and are contributing to the deterioration of the economic position of the weaker sections in the rural areas. "As bad as urban situation is, almost everywhere the rural unemployment problem is numerically worse; and since it involves the poorest people of the society, it is even more

tragic."¹ It may be noted that there was worsening of the employment situation, particularly in the rural areas, in spite of the growth in the national economy that has taken place under the five year plans. This is due to not only very low rate of growth but also relatively capital intensive investments and lack of adequate emphasis on agricultural development programmes. In view of this situation, there has been certain disenchantment with growth as the sole objective of development planning. There is a new awareness. It is the manner in which growth is obtained that is of crucial importance from the point of view of employment generation and amelioration of the rural poor.

3 GROWTH AND SOCIAL JUSTICE

Planning and Social Justice

6.3.1 The ultimate goal of economic planning, as we envisage it, is to establish an egalitarian and prosperous society. Economic development has till recently emphasised a rapid rate of growth of the national product to attain this goal. There is a school of economic thought which proceeds on the basis that there is an inherent conflict between the requirements of development and the needs of social justice. The development objective is linked to production in aggregate as well as in per capita terms and its rate of change over time. According to this approach, investment planning has to ensure that the limited available resources are channelled into the most productive lines to generate enough surplus for saving and reinvestment. Capital accumulation is thus considered the sole means of economic growth. It is assumed that once growth takes place, its spread effect will activise different sectors and create employment opportunities for the people leading to an overall improvement in the standard of living and welfare of the masses. It is also believed that efforts to promote social justice through reduction in income inequalities will eventually slow down the rate of growth and income generation.

6.3.2. Experience has, however, shown that growth by itself does not lead to emelioration of poverty. Studies on the process of economic development in several developing nations, where satisfactory rates of growth of the economy have been achieved during the recent past, bear out that growth has not always been able to make any significant impact on employment and poverty. On the contrary, unemployment and inequality have been accentuated.

¹ Robert S. MacNamara, President, World Bank Group, 1971. Address to the Board of Governors : 12. Washington, International Bank for Reconstruction and Development.

6.3.3 Current thinking has, therefore, somewhat altered the approach to development planning. A high growth rate is a necessary but not sufficient condition to ensure employment generation and income distribution in favour of the masses and reduction of mass poverty. Growth has to be linked with the ultimate goal of planning. Since the creation of an egalitarian society is the aim of planning, the aspect of income distribution in the growth process cannot be divorced from the production aspect. Investment planning from the beginning should simultaneously seek growth and social justice through the creation of productive employment and generation of income on a widely dispersed basis. The fiscal mechanism is not considered adequate to secure redistribution of incomes in directions which are socially desirable. This is primarily due to its narrow base and the difficulty in operating it within the political systems obtaining in the developing countries. Therefore, stress is laid on the need for redefining the approach to planning to emphasise reduction of mass poverty. For this purpose, direct measures are suggested to tackle the problem of poverty. These include programmes which would involve the bulk of the population in productive employment to increase their earning capacity so that both growth and distributive justice can be achieved.

6.3.4 The experience in India is not different from that of other developing countries. While there has been growth in the economy since planned development started, it has hardly any effect on the worsening problem of unemployment and poverty. Growth, both industrial and agricultural, is confined to certain parts of the country and certain classes of the people aggravating thereby income inequalities and regional imbalance. It has been acknowledged that "a high rate of growth is not a substitute for deliberate policies to ensure equitable distribution of the gains of development. In the absence of such policies, the processes of economic development, as we have witnessed them in the past, makes the rich far too rich before the poor can secure even the minimum, widen the gulf between the rich and the poor intolerably and inevitably undermine the democratic foundations of the economy".¹

6.3.5 There is no inherent conflict between growth and social justice. Growth *per se* is important. Without overall growth, no progress can be achieved. The development policy must, therefore, seek to attain continuous growth of the economy. But there has to be distributive justice in the very process of this growth and it is possible to improve growth performance at the same time as social justice is secured provided appropriate policies are evolved to ensure both. A policy that is totally indifferent to distributive justice is self-destructive and, therefore, untenable.

6.3.6 For greater distributive justice in the growth process in the Indian economy, the involvement of the weaker sections of the rural population

¹ *Ibid.*, 1 (p. 29): 51

will be necessary as participants in the process of development as well as in the sharing of its fruit. This is the only way to transform the economic and social conditions of small and marginal farmers, landless agricultural labourers, rural artisans and others engaged in traditionally poor occupations and make a significant impact on the problems of rural poverty while achieving sustained growth. The main elements in this transformation are changes in the productive systems of agriculture and changes in the occupational structure of the rural community.

6.3.7 To bring about these changes, measures in several directions are required. It is necessary to ensure that agricultural production activities are widely diffused with accent on labour utilisation and yield improvement. An important prerequisite is obviously to redefine the land relations and create conditions for intensive and scientific use of the available land resource which will lead to increased employment, output and income. Not all the rural households can, however, be gainfully employed in crop production. It thus becomes necessary to diversify agricultural activities by developing occupations like animal husbandry, fisheries and forestry. Animal husbandry is a traditional rural occupation which is practised as a complement to crop production by the bulk of the rural population. Livestock enterprise is highly labour intensive and offers substantial scope for employment and income. Inland and marine fishery and some forestry activities also can improve employment, output and income. In the following paragraphs, these aspects are further examined in the context of dispersal of employment opportunities, equitable distribution of income and reduction of imbalances.

Need for Agrarian Reforms

6.3.8 Considerations of equity and growth demand a reappraisal of the existing agrarian relations. The introduction of modern technology in crop production has led to the emergence of a new type of land owners in the rural areas, the progressive commercial farmers. These early adopters have reaped large surpluses accentuating the prevailing disparities in income and wealth. Their surpluses are all the more because of the considerable subsidy that irrigation and electricity carry with them. The high pay-off has led the landowners to resume land for personal cultivation by evicting tenants and sharecroppers and increase their sphere of influence in the rural society. The introduction of modern technology has, therefore, become an additional source of tenurial insecurity and led to a general deterioration in the position of tenants and sharecroppers. This development alongside the inequitable distribution of agricultural incomes has become a possible source of social tension in the rural areas.

6.3.9 A related development which has worked against the interests of

tenants and small farmers is the rapid rise in land values since 1965 leading to speculative buying and selling of land. While there are several contributing factors, increased productivity through the adoption of high yielding varieties and other technological improvements must be the most important. Between 1965 and 1970, land values in Ludhiana district rose by 90 per cent and in Patiala, Ferozepur and Hissar by 80 percent.¹ The steep increase in value has the effect of preventing the landless from obtaining land or the small farmers from increasing their holdings. On the other hand, the increased land values have encouraged the small farmers to sell their holdings. Consequently, more and more of them join the ranks of landless, labour. This has strengthened the economic position of the large land owners and weakened that of the landless. This is also reflected in the rising costs of tenancy.

6.3.10 In an economy where output per hectare is already low, the basic problem is whether the agrarian structure can bear both the rentier and the tiller. The economics of the present system of division of responsibility and usufruct is brought out glaringly in a study carried out in the Thanjavur district.² This study was an economic appraisal of the owner-operated and tenant-operated farms in Thanjavur district during 1965-68. For the *kuruvai* and *thaladi* crops, the net income of the tiller is Rs 175.02 per acre (0.4 hectare) against his investment of owned resources of Rs 113.60 in *kuruvai* and Rs 73.60 in *thaladi*. Thereby, he has not got even his own investment in labour and farm yard manure in the operation. In *samba*, the position is even worse. He gets an income of Rs 45.65 per acre (0.4 hectare) against an investment of Rs 104.20 in owned labour and manures. The landlord gets Rs 312 in the former case as rent and Rs 205 in the latter. For the landlord, at the then prevailing land values in the district, he does not get even a fair interest on capital. It is obvious that the system cannot in fairness bear both a rentier and a tiller. The rentier system is just neither to the landlord nor to the tenant. The State policy must, therefore, favour peasant proprietorship in Indian agriculture.

6.3.11 The present agrarian structure is outmoded and inefficient as a basis for increased production. A recent study in the Kosi command area in Bihar³ has clearly shown that whereas small landowners have fully utilised the available irrigation to raise crops in their small holdings, the bigger landholders, who cultivate through sharecroppers, have not taken similar interest leaving large land area unutilised. It has been observed that

1 Brian Lockwood, 1972. Patterns of Investment in Farm Machinery and Equipment, Economic and Political Weekly, VII(40)

2 An Economic Appraisal of the Owner-operated and Tenant-operated Farms in Thanjavur District (1965-1968). Coimbatore, Agricultural Economics and Rural Sociology Section of the Agricultural College and Research Institute.

3 Pradhan, S. Prasad, 1972: Economic Benefits in the Kosi Command Area: 38-39. Patna, ANS Institute of Social Studies (Mimeo).

rabi irrigation is inversely related to the size of holding as the table below will show :—

TABLE 6.2
Irrigation Utilisation by Size Class of Holdings

Kharif irrigation class size (ha)	Number of households	Total kharif irrigation (ha)	Total rabi irrigation (ha)	Percentage of rabi irrigation to kharif irrigation
1	2	3	4	5
0 to .8	259	148.64	152.24	102.43
.8 to 2	117	188.38	125.05	66.38
2 to 4	49	156.61	89.43	57.11
4 to 8	13	73.04	39.66	54.20
8 & above	3	84.00	22.26	26.50
Total	41	650.67	428.64	65.88

6.3.12 The study has noted that this has happened when the rabi irrigation is available for the entire area for which irrigation is available in Kharif. The sharecroppers of big landowners do not grow a rabi crop (wheat) for lack of resources and as "the existing sharing practice hardly offers any incentive to the sharecroppers for putting in extra labour". The report has concluded that if crop sharing arrangements in rabi are tilted in favour of the sharecropper, there is likelihood of a more intensive use of land and labour. But the constraint is the attitude of the influential landowners who do not want to lose their hold on the poor peasantry. They prefer to exercise their economic and political power in a manner so as to perpetuate the already weak bargaining position of the bulk of the peasantry and thereby ensure that their position of supremacy is not undermined.

6.3.13 The contribution of the existing agrarian structure to capital formation and general economic development is limited. While the greater part of the population is too poor to afford a minimum level of consumption, the surpluses of the progressive farmers accruing as a result of the adoption of new technology is only partially being reinvested in agriculture or agro-industries. Most of the surpluses are being devoted to luxury and conspicuous consumption or used for the purchase of urban property, purchase of land, usury and other forms of exploitation. In such a situation, the peasant masses have neither the ability nor the incentive to increase production. In the absence of major reform, the whole rural economy stagnates impeding agricultural growth and an equitable distribution of output and

income. Higher production through a labour-intensive modern technology requires a high degree of social and economic equality among the rural population. Only an equitable land tenure system can provide the institutional framework to make increased production based on modern technology possible.

6.3.14 It is, therefore, important from the point of view of both growth and social justice to link land reforms with programmes to increase agricultural production. An equitable land tenure arrangement ensures better distributive justice inasmuch as "the higher the distributive equity, the larger the role of those smaller farm sizes on which production per area unit is larger because of more intensive land use systems and more labour intensive cultivation practices."¹ On the contrary, very low distributive equity which is a characteristic of the existing agrarian structure will, through limited access to land, prevent intensive utilisation of land as well as labour on such land. As higher production, increased employment and greater social and economic equality are complementary objectives, the land tenure system with the unequal distribution of land and inputs is a hindrance to the intensive application of labour. Likewise, insecurity of tenancy and share cropping come in the way of full utilisation of available labour. Further, a system which restricts production also restricts consumption. The low level of output and income accruing to the small farmers and landless labourers lowers the economic demand for both food and other goods needed by the low income sections of the rural population and consequently reduces their levels of consumption. This has the direct effect of depressing the nutritional levels of the diet of the working population impairing their ability to work and reducing their productivity. In such a situation, land reform as a means of improving distributive justice is likely to have the desirable effect of raising the productivity of agricultural workers through extended employment and higher income and consumption. The redistribution of purchasing power will mean increased market demand for consumer goods, particularly the items of mass consumption like clothing, footwear, household goods, etc. Such beneficial impact has been seen in countries like Iran, Bolivia, Venezuela and other Latin American countries after land reform measures were implemented. The process is likely to set off multiplier effects on the national economy resulting in greater utilisation of industrial capacity and more employment.

6.3.15 The increased demand from the rural peasantry will be for mass consumption goods which can be produced in the country with labour-intensive technology. On the contrary, if the skewed pattern

¹ Folke Dovring, 1973. Land Reform: Ends and Means—A Background Study to the IBRD Policy Paper on Land Reform: 22. Washington, International Bank for Reconstruction and Development. (Mimeo).

of income distribution is allowed to continue, the production pattern will tend to cater to the needs of the affluent sections for sophisticated and luxury goods, which generally have a higher import content, and thus get distorted. It is generally thought that distributive equity results in smaller direct individual savings. But as Dovring¹ has pointed out, this need not necessarily be so. With higher distributive equity, social attitudes may change and the absolute level of savings may increase even though individual savings may be small. Moreover, the rate of savings in countries with low distributive equity has not been particularly high. More importantly, increased consumption by the large mass of rural peasantry is expected to lead to higher production and income in other sectors of the economy and accelerate industrial capital formation. This may reduce the pressure of draft on rural savings for investment in industry as more internal savings accrue to that sector. It is also necessary to see that as a consequence of land reform, the improvement of the land which the large number of small farmers are encouraged to undertake by their own means will itself be a form of savings.

6.3.16 From the foregoing analysis, the effect of land reform on distributive equity is clear. If growth has to be durable, it must proceed with social justice. To ensure, therefore, that the small farmers and landless labourers also able to share in the new opportunities provided by modern technology, land reform must constitute the basic infrastructure in the process of modernisation. It is important to recognise that unless appropriate measures are taken to protect the poorest sections of the agricultural population, the introduction of improved technology can only result in increasing the disparities and lead to a dangerous disequilibrium in the rural economy and the rural society.

6.3.17 It must, however, be pointed out that distributive equity, while starting from land reform, does not end there. In order to make it effective, it is essential to ensure access to the means of production and marketing facilities. Improved tenancy arrangements, more equitable distribution of land holdings and the institutions for provision of credit, supplies, services and marketing, which together constitute the agrarian structure will, in the final analysis, determine the pattern and quality of agricultural prosperity and, therefore, of agricultural as well as rural development.

The New Strategy and the Emerging Disparities

6.3.18 The new strategy in agricultural development has no doubt opened up vast possibilities for rural growth and development. It has,

¹ *Ibid.*, 1(p. 39): 28-29

however, bypassed a large section of rural population particularly the small farmers, tenants, sharecroppers and agricultural labourers. It is, therefore, necessary to examine closely the emerging situation and to explore the ways and means for utilising the modern technology for the creation of larger and more gainful employment opportunities and thereby raising the living standards of the weaker sections in the rural areas.

6.3.19 The recent technological developments in crop production in the country have taken place without simultaneous and appropriate institutional changes in the rural areas. The result has been an extremely uneven distribution of the gains from improved technology among the different classes of rural population and a rapid widening of the existing disparities in incomes and levels of living. As long as the access to easy credit and inputs, such as fertilisers, is confined only to the relatively well-to-do farmers, there is bound to be an imbalance in the enjoyment of the gains from development. Field investigations in western Uttar Pradesh for example, revealed that income inequalities had increased with the introduction of high yielding varieties, not only because of variations in the size of holdings but also because of unequal access to inputs, credit and technical know-how and the difficulties in the timely availability of these supplies and services.¹ A study conducted in the prosperous district of East Godavari also comes up with similar results. Apart from stressing that with the introduction of modern technology the richer classes have reaped disproportionate benefits, it also highlights that small cultivators and labourers studied reported a fall in the value of their assets and also excess of expenditure over income.² A field study in Ferozepur district³ revealed that while the incomes of all categories of farmers increased over a five-year period, the large farmers gained more than the small and medium farmers, the gains by the large farmers being made possible by large capital investment in building up farm infrastructure and heavy borrowings from the financial institutions. The study showed that in terms of per capita income, there was a wide gap between small and large farmers.

6.3.20 It is no doubt true that part of the gains from the improved technology is due to efforts put in, risks taken and investments made by the affluent farmers. But it cannot be gainsaid that part of the increased in-

1 Shah, S. L. and Singh, L. R., 1970. Increasing income disparities due to the new technology of agriculture in North West U.P., Indian Journal of Agricultural Economics Conference Number.

2 Sarveswara Rao, B., 1973. (i) Study of Incomes, Savings and Investments of selected cultivator households in East Godavari District, Andhra Pradesh, Report for the year 1969-70: 243-253 and (ii) Study of Incomes, Savings and Investments of selected labour households in East Godavari District, Andhra Pradesh, Report for the year 1969-70 : 42-43. Waltair, Agro-Economic Research Centre, Andhra University.

3 Kahlon, A. S. and Gurbachan Singh, 1973. Social and Economic Implications of large-scale introduction of High Yielding Varieties of Wheat in the Punjab with special reference to Ferozepur district: 111. Ludhiana, Department of Economics and Sociology, Punjab Agricultural University.

comes of these commercial farmers is also the result of public investment in irrigation system, electricity, fertiliser plants, agricultural research, extension service, subsidised credit etc. For these supplies and services, which the State has brought into being and all of which carry heavy public subsidy, the affluent farmers have not borne the full proportionate costs of development though they have been the principal beneficiaries. Considering that much of the gains from the investments, instead of being recycled for investment, is being used up by these rural upper classes in wasteful expenditure and conspicuous consumption, holding back of stocks, usury and other forms of exploitation, there is no reason for continuing any direct subsidy for this section of the farmers. It is, therefore, only legitimate on considerations of social justice that this part of the State expenditure should be fully recovered for re-investment in large-scale programmes to improve the productive capability and living conditions of small and marginal farmers and agricultural labour, who have so far been left out, in order that the disparities in income distribution as between the rich and the poor farmers are progressively reduced. It follows that the more affluent sections of the rural society should bear the full cost of their growth.

Scale Neutrality—Inputs and Services

6.3.21 In principle, the new high-yielding varieties are neutral to scale. Used in combination with fertilisers, water and other inputs, they can ensure higher yields for both large and small farmers. According to a study undertaken by the Programme Evaluation Organisation of the Planning Commission and the Australian National University,¹ once the small farmer made the decision to participate in the new technology, he was, on the average, likely to sow much the same proportion of his crop to the high yielding varieties, to use as much fertilisers, to spend almost as much on cash inputs and hired labour and to achieve similar yields as the large farmer. Even so, the study has established that so far as adoption of the high yielding varieties is concerned, there has been less participation amongst small farmers compared with the large farm groups.

6.3.22 As Dovring has shown², "agriculture may very well be organised on very small predominantly family-scale farms and still achieve high levels of productivity both of land and of labour". This conclusion is supported by the fact that the highest land productivities are in countries such as

¹ Brian Lockwood, Mukherjee, P. K. and Shand, R. T., 1971. The High Yielding Varieties Programme in India Part I (Draft): 105-106. Programme Evaluation, Organisation, Planning Commission, Government of India, and the Australian National University Research School of Pacific Studies, Department of Economics (Mimeo).

² *Ibid.*, 1 (p. 39): 62-63.

Taiwan, Japan and Egypt where farms are very small. The ability of very small farms to achieve very high output levels reflect the capacity of these farms "to use their resources to the hilt". The output and value added per man engaged in crop production in Taiwan are several times higher than those in India and noticeably higher than in several other countries. The same is true of very small farms in Belgium and the Netherlands among European countries, which compare favourably with the United Kingdom which has much larger farms. In Mexico small holdings could compete with the larger farms in terms of productivity, even when the land in small holdings was of lower average quality, and could obtain about the same yield level, even with less fertiliser and other inputs. It implies that productivity on small farms with comparable resources must be higher than on large farms.

6.3.23 If the bulk of small and marginal farmers is to participate in and benefit from the new technology, neutrality in respect of scale of operations would also have to be practised in the matter of a wide range of supporting services including the supply of water, fertilisers, pesticides and credit as well as marketing facilities. In actual practice, however, the situation is quite different. In the prevailing field situation, there are a number of bottlenecks in the rural service structure which makes the adoption of the new technology on small holding risky and difficult and, therefore, not strictly neutral to scale.

6.3.24 The new technology has improved the economics of small holdings immensely. But there are many difficulties arising out of the present position of the small and marginal farmers in the village and the defects in the infrastructure which prevent them from utilising the available potential economically. If water could be made available to the small and marginal farmers for an intensive programme of crop production, their problems, by and large, would have been solved. But there are difficulties in ensuring proper utilisation of water. In some of the irrigation systems, a substantial part of the available water is pre-empted by the large farmers with the result that the small farmers often go without water. The study of the economic benefits in the Kosi command area¹, already referred to, reveals that large farmers were able to appropriate a larger share of the available water in comparison to small farmers. Similarly, in areas where ground-water is scarce, the richer classes often pre-empt the available supplies by investing in groundwater. The system of financing the development of irrigation sources is such that only medium and bigger farmers can take advantage of the loaning facilities. Individual investment by small farmers in groundwater sources will be costly and is beyond their capacity. The group-owned well system, as explained later, could be specially encouraged to ensure water to small holdings and to prevent pre-emption of

¹ *Ibid.*,³ (p. 37). 16

well water by large farmers. In canal commands also, the State will have to make certain that small holdings receive adequate water, by creating the required infrastructure and by exercising proper control.

6.3.25 Besides the lack of irrigation support, lack of proper drainage and comprehensive pest control programme have had adverse impact on intensive crop production in irrigated areas. As there are no established drainages in the commands of the irrigation projects which can clear the water from every field, the normal practice is to drain the water from field to field. In this, the bigger and influential farmers in the villages have an edge over the small and marginal farmers in that the former, whenever they want to drain out their land, can do so by draining water into the neighbouring plots of small farmers. The small farmer cannot do so on his side because of his unequal position. Similarly, he is at a disadvantage in the matter of pest and disease control. If a large farmer protects his land by the adoption of plant protection measures, even in the event of pest attack from neighbouring fields, the effect will be serious on the borders but a good portion of a large holding may still be protected because the border may act as a buffer till the routing spraying is done. On the other hand, if a small farmer's neighbouring fields have not carried out spraying, his entire field becomes the border and is fully affected. In the field conditions, therefore, the effect of lack of pest and disease control acts with varying impact on the large and small farmers engaged in intensive crop production. Taking all these risks together, it will be observed that the field conditions are very much in favour of the large farmers. These are only a few examples of the relative disadvantages under which the smaller farmers have to operate. The physical and social conditions in the village are responsible for this. Even though the technology is neutral to scale as between large and small farmers, there seems to be constraints in the field conditions which make the adoption of modern technology not strictly neutral to scale.

6.3.26 The realities of field situation analysed above will explain the relative incapacity of the small and marginal farmers to take to credit services as much as the large farmer does. This, in effect, creates a certain reluctance in the small farmer in taking the risks involved in the adoption of modern technology. In other words, if irrigation and drainage can be controlled and the field channel and field drainage system can be made comprehensive so that a proper system of irrigation can be worked out and if the whole command area can be made to follow the pest and disease control routine, it will be reasonable to expect returns on small farmers' holdings as expected and on a basis neutral to scale. The growth process may in fact be impeded if the powerful and influential sections in the rural areas do not allow the small farmers to utilise the available facilities and

services as they themselves do. In such an event, the State will have to play its role in order to ensure justice to the small and marginal farmers by evolving proper irrigation, drainage, pest and disease control programmes on an area basis so as to see that the benefits are not utilised by the well-to-do section to the detriment of the weaker sections. In whichever area, therefore, an intensive programme of growth is being undertaken, it must be the responsibility of the State, as a matter of ensuring social justice, to maintain order on the canal irrigation system so as to ensure proper water control and management. On the same principle, a master drainage system should similarly be constructed and order maintained by the State. Statutorily, there must be a provision to enforce a pest and disease control routine for the entire area with provision for recovery of proportionate charges from farmers. The entire programme of intensive cultivation will then become creditworthy and neutral to scale enabling small and marginal farmers to fully utilise credit and inputs to much the same relative extent and in much the same manner as large farmers do.

6.3.27 What is true of irrigation, drainage and plant protection is equally true of the entire rural service structure and the rural institutions which serve the farmers. Modern technology has a high demand for rural services such as credit, extension services, input supply, transport and marketing. Much of the difference in returns from large and small holdings is directly attributable to differences in access to and unequal sharing of the rural services as between large and small farmers, the bulk of the available services being almost always pre-empted by the bigger ones. In most of the States, the cooperatives have not met the credit needs of small farmers. According to a study¹ of 90 randomly selected farms in Madurai district (Tamil Nadu), the cooperatives advanced credit to 82 per cent of large farmers accounting for 62 per cent of the total credit given. Small farmers, on the other hand, whose need for credit was larger in relation to the farm expenses, were unable to get this service from the cooperatives. In Kalyanpur block in Kanpur district (Uttar Pradesh) the bulk of the loan was advanced to farmers with holding of 4.4 hectares and above. The case study in Ajmer district (Rajasthan) revealed that the cooperatives had neglected small farmers with holdings of less than 2 hectares.

6.3.28 Special efforts have to be made to bring rural services within the easy reach of small and marginal farmers and agricultural labourers. Without access to these services, they have no chance to benefit from the modern labour intensive agricultural technology. Failure in this regard would mean the emergence of a more pronounced dualistic agriculture.

¹ 1972. Levels of Technology in Agriculture and Employment. New Delhi, Background Paper prepared for the Joint Workshop on Employment Generation Organised by the Expert Committee on Unemployment in Collaboration with the International Labour Office.

and the accentuation of the disparities. On the one side, there will be the progressive sector consisting of large farmers who have access to capital and inputs and earn high incomes through high yields which make further investments and still higher incomes possible. On the other side, there will remain a large subsistence sector consisting of small farmers, lacking in capital and other resources and having low yields and small incomes. From considerations of both growth and social justice, therefore, it will be necessary for the State to devise ways and means of actively involving the large mass of peasants and labourers in modern agriculture so that they have a full sense of participation and benefit from higher productivity and intensive use of labour. This needs such institutional changes as would ensure the widest possible spread of improved technology amongst the rural population engaged in agriculture. It was with this end in view that we have already suggested in our Interim Report on Credit Services for Small and Marginal Farmers and Agricultural Labourers the creation of an integrated and supervised credit structure and the establishment of Farmers' Service Societies designed to cater effectively to the needs of small and marginal farmers and agricultural labourers.

Inter-Regional Disparity

6.3.29 While growth in output is important in agricultural development, there are other considerations as well. How such growth is distributed among the different regions of the country and among different classes of people and the social costs and benefits of such growth are also important considerations in the process of development. In achieving a sustained growth, there are a number of constraints on development causing disparate growth in output and income as between irrigated and unirrigated areas and even in irrigated areas, as between irrigated areas more or less similarly situated with respect to amount of irrigation, intensity of cropping, cropping pattern, distribution of rainfall and soil fertility. An analysis of irrigated farming in certain selected districts in Punjab, Haryana, Madhya Pradesh and Uttar Pradesh during 1969-70 has revealed considerable differences in the level of output per hectare despite the fact that these districts have comparable extent of irrigation and distribution of rainfall, similar intensity of cropping and cropping pattern as well as soil fertility rating. Table 6.3 will show that the district of Ambala in Haryana has a per hectare yield twice as much as Balaghat in Madhya Pradesh and 1.6 times that of Bareilly in Uttar Pradesh. Similarly, the output per hectare in Hoshiarpur district of Punjab is higher compared with Varanasi and Deoria districts in Uttar Pradesh and that of Rohtak in Haryana is 50 per cent higher than in Mathura and Azamgarh districts of Uttar Pradesh.

TABLE 6.3
Output Differentials by Irrigation Intensity

State/District		Percentage of area irrigated	Per hectare gross value of output (Rs)
Haryana	Ambala	20 to 30%	1,500
Madhya Pradesh	Balaghat		751
Uttar Pradesh	Bareilly		909
Punjab	Hoshiarpur	30 to 40%	1,010
Uttar Pradesh	Varanasi		715
	Deoria		988
Haryana	Rohtak	40 to 50%	1,200
Uttar Pradesh	Mathura		814
	Azamgarh		767

6.3.30 The differential growth rates even in irrigated areas highlights the limited spread and the uneven adoption of modern technology. While inadequate services to farmers following the creation of the basic facility of irrigation can be an important reason for the uneven performance, it is also true that motivational factors play an important part in the use of all the facilities which the State has created. The human attitude and ingenuity contributes significantly to the growth of a region. This is clearly established in the case of Punjab and Haryana when compared with other regions. While it is for the State to create the necessary supporting services so that the farmers can make full use of the endowments of a region, growth will not take place unless the population gets adequately motivated to take the advantage. In many areas, this lack of motivation may be due to the prevailing socio-political conditions. The big landlords wield considerable political power and influence on servicing institutions on the one hand and influence on the poor peasants and agricultural labourers through exploitation, usury and other means, on the other. They find it to their advantage to hinder progress by this section of the society so that their social and political control on them remains unaffected. This also explains the uneven development among areas.

6.3.31 The situation described above, however, gives rise to an important issue bearing on State policy. Even in areas endowed with irrigation facilities, there is considerable leeway to be made up between district and district to attain comparable levels of output per hectare so as to maximise the returns on large State investments in irrigation projects and other infrastructural development. Since these are potential areas for immediate production gains, the State has to strengthen the supporting structure for

raising output and optimising returns from the investments already made by it. Such action will increase opportunities for employment and incomes in these irrigated areas through sustained and widespread diffusion of the benefits of development over large areas and among larger number of people.

Dry and Drought Prone Areas

6.3.32 Apart from differences in the levels of development among irrigated areas, disparity between the more developed irrigated areas and dry areas is widening. Indeed, the drought prone areas are a major factor contributing to the regional disparities in the country being poorly endowed and marked by very low and unstable yields from agriculture. The dry areas suffer not only from lack of adequate irrigation facilities but also from inadequate marketing, credit and other infrastructural support. Favourable conditions and adoption of new technology in irrigated areas are likely to lead to their faster progress, thereby widening the disparity. Measures are, therefore, necessary to increase the pace of development in dry areas to contain and, where possible, reduce the differences in growth levels.

6.3.33 According to the present assessment of the utilisable irrigation potential of the country only about half of the total area under crops (*i.e.* about 110 million hectares) can be covered by irrigation sources both surface and groundwater. These water resources are, however, not evenly distributed being abundant in the Indo-Gangetic plain and negligible in the Saurashtra-Kutch region of Gujarat, the south-western part of Rajasthan and other arid regions. In the drought prone areas, in particular, the irrigation possibilities are meagre. As we have observed in the Interim Report on Modernising Irrigation System and Development of Commanded Areas, even with the full harnessing of the water resources only about a fourth of the cropped area in the drought prone districts would be irrigated. This indicates that half of the cropped area in the country has to remain under rainfed cultivation and proportionately a much larger area in the drought prone districts has to make do with precarious rainfall. The areas relatively better endowed with irrigation facilities, therefore, should make the most economical and efficient use of available water in order to spread the benefits of irrigation over a much larger area than has been possible so far.

6.3.34 In dry and drought prone areas, inadequacy of water acts as a major constraint on the improvement of the economy of the farming community as a whole and, more particularly, of the small and marginal farmers. Considerations of balanced regional development and social justice require that the State should undertake certain commitments in these

regions. In areas where surface water schemes or large-scale groundwater schemes are possible, the State should assume responsibility to plan for such irrigation schemes as a matter of priority. Since the scope for irrigation development in drought prone areas is limited, the State should, as a national policy, explore the possibility of diverting surplus waters from one part of a river basin to another or from other river basins to give a minimum irrigation support to these areas.

6.3.35 Individual small farmer's capacity to invest in wells or tubewells in such low rainfall areas is meagre. Social and economic considerations require that the State should give preferential treatment to the small and marginal farmers in utilising groundwater. Wherever the available groundwater potential is exploited, a group approach to meet the needs of the small and marginal farmers will have to be considered. Small and marginal farmers having contiguous holdings can profitably take to group-owned wells on Rajasthan pattern, where the rights of the members are recorded in the revenue records and water is shared equitably. However, where scattered holdings of small and marginal farmers could be brought together in compact blocks, preferential irrigation could be given through a State sponsored programme of community wells. Large farmers, who might have their lands in the commands of these irrigation source, should also receive the benefit of irrigation for optimum utilisation of water; but any financial assistance in the nature of subsidy should be made available only to the small and marginal farmers in the irrigation command.

6.3.36 In difficult areas all group wells may not be successful. Some may be dry and some may not have adequate water for irrigation. There is thus a risk involved in sinking wells and this problem of risk will have to be rationalised. The financial loss in the case of completely failed wells should be borne entirely by the State and proportionate costs recovered in the case of others. These and other aspects of the problem of extending irrigation in the dry and difficult areas have been examined and appropriate recommendations made in our Interim Reports on Reorientation Programmes of Small Farmers and Marginal Farmers and Agricultural Labourers Development Agencies and Whole Village Development Programme.

6.3.37 Apart from lack of water, the absence of a suitable technology for dry farming has resulted in the cultivation of inferior crops by the farmers in these areas. Output levels in these areas have, therefore, been perpetually low with socially undesirable effects in terms of both income and employment for the bulk of the farming population. The fact is that the recent technological developments are, as yet, confined to certain cereals and cotton only. A large number of other crops (*viz.* pulses, millets, oil-seeds, etc), which are extensively grown in the dry farming tracts of the country, are still to derive the benefit of a technological breakthrough.

6.3.38 Special measures are required to develop and stabilise the econo-

my of these areas. Agricultural research needs to be specifically directed towards evolving appropriate varieties and cultivation practices in respect of cereals, millets and pulses and cash crops raised in these regions. The evolution of a suitable dry farming technology including moisture conservation and water harvesting techniques and the creation of an appropriate network of services to help in the universal extension of such a technology to even very small holdings in the vast dry regions of the country should be a major concern of the State. Equally important is the need to evolve appropriate cropping patterns for these areas for stabilising the yields and laying a firm base for the adoption of mixed farming which alone can give supplemental income to an otherwise non-viable and vulnerable farming population.

6.3.39 While crop production has its own importance in promoting growth and development of these areas, animal husbandry suitably supported by range management in natural grass lands and pasture development on village common lands could be a more stable base for supplemental and sustained income to a vast section of the rural population. There is immense scope for bringing available grass lands in the vicinity of villages and extensive natural grass lands in the forest areas, as in Rajasthan and Gujarat States, under improved range management so as to provide additional grazing facilities for extended periods for the livestock population in these areas. This would not only restore the ecological balance of the dry and drought prone areas but would also provide the basic support for development of animal husbandry, creating in the process additional opportunities of employment for the rural people. Of particular advantage to the economy of these areas is the development of fodder crops around sources of irrigation. Availability of feed and fodder can provide the necessary support to a well organised livestock production programme in these areas. These and other aspects bearing on the development of dry and drought prone areas have been examined in detail in our Interim Reports on Desert Development Social Forestry, Milk Production through Small and Marginal Farmers and Agricultural Labourers and Poultry, Sheep and Pig.

Hill and Tribal Areas

6.3.40 Areas which have particularly remained backward for historical, sociological, economic and other reasons include the hill areas and tribal areas. Although the development of these areas by utilising their growth potentials has been the objective of State policy over the years, both for reducing regional disparities and for ensuring social justice to the weaker sections of the population, a long way has to be travelled before these goals are realised. The State has a special responsibility in respect of these areas

because of their peculiar characteristics and particular weaknesses.

6.3.41 Most of the development problems in the hills arise out of the basic limitations imposed by their physico-geographical conditions. The main causes of backwardness of the hill areas are: (a) thin and very uneven dispersal of productive resources over vast areas; (b) high cost of development of infrastructure and service facilities and their maintenance because of the terrain and the low density of population, (c) lack of knowledge about resource endowment, (d) inadequacy of research and operational experience specially relevant to the conditions and problems of hill areas and (e) insufficient accent on the integrated development of these areas to suit local conditions.

6.3.42 Accelerated development of hill areas needs proper planning specifically oriented to the local conditions. The formulation of programmes has to be in consonance with the topographical and agro-climatic conditions of the areas, the availability of natural resources, the peculiarity of socio-cultural structure and the nature of inter-action between the hills and the plains. Hill areas are suitable for livestock production and horticulture; but the growth problems in the hill region are not merely those of increase in area and production of extension of irrigation, improvement in animal husbandry, etc. The problems of agriculture have to be viewed in the broader context of the social and cultural characteristics of the hill people and the need to evolve programmes which could ensure equity by bringing in the whole hill community into the process of development.

6.3.43 The problem of development of tribal areas is primarily linked with the general backwardness of these areas, poverty of the tribals, exploitation by non-tribals and the absence of social and cultural integration of the tribes with the rest of the population. These areas are good for crop production and pig rearing. In spite of earlier investment and other developmental efforts for the improvement of tribal areas, productivity there has not been able to reach the corresponding levels elsewhere. Many tribal habitations are in the interior and forest areas and isolated for lack of communication. Development is hindered due to the absence of communication and marketing facilities which would have at least enabled a flow of income to the tribal population. Thus, the tribal areas, by and large, have failed to benefit from the impact of the new technology. This uneven sharing of gains from technological developments and the resulting disparities in income distribution have, at places, led to acute social tensions. The slow pace of agricultural development and the continuing exploitation of the tribals by non-tribals underscore the need for intensive social and economic development of these areas in the country.

6.3.44 In the foregoing paragraphs we have highlighted the disparities which have arisen as a result of inter-regional and inter-district variations.

in resource endowments, stages of development reflected in the institutional and infrastructural support and the socio-cultural characteristics of the people. For attacking the problem of poverty in these areas it is necessary to differentiate one area from another and evolve location-specific programmes of development based on a careful identification of the causes of backwardness as well as the potential available for growth. The problems of development and programmes required for improvement of the economy and living conditions of the people in the hill areas, tribal areas, drought prone and dry farming areas of the country and the required orientation in State policy have been discussed in further detail in Chapter 59 on Special Area Development Programmes.

Diversification of Employment Opportunities

6.3.45 The low level of rural incomes and, therefore the low standard of living of the rural population are the result of serious under employment as well as open un-employment in rural areas. Crop production alone cannot give adequate employment and a minimum level of income to the bulk of the rural population. This is particularly true of low rain fall regions in the country (*viz.* the desert, dry and drought prone areas) to which we have made a reference a little earlier. Even in better endowed areas, the low per capita availability of land for the bulk of the farming population is a constraint on the possibilities of increasing their incomes sufficiently from land alone. It thus becomes necessary to diversify rural employment opportunities by developing suitable subsidiary occupations such as dairying, rearing of poultry, sheep and pig, fish farming, bee keeping and sericulture. These subsidiary occupations could provide gainful employment to the farming community, particularly the female folk, throughout the year and more so to those raising a single crop in rainfed areas.

6.3.46 Traditionally, milk production or rearing of poultry, sheep and pig, sericulture, etc. are largely rural occupations and, what is more are being pursued throughout the country by the economically poor and socially backward sections of the population. Traditional animal husbandry practices do not give sufficient incomes because of low productivity of the stock maintained by these farmers. Improvement in productivity of livestock and poultry and their rearing by the weaker sections of the rural population could be a means of creating additional incomes in the rural sector and a major instrument in reducing income inequalities.

6.3.47 Dairying is an important source of supplemental income to farmers. Studies have revealed that very small farmers not only maintained milch animals but obtained a higher proportion of income from dairying to total farm income than farmers with relatively larger holdings

did. What is noteworthy is the fact that since a large section of small and marginal farmers and agricultural labourers have been traditionally raising milch animals, they are in an advantageous position to derive benefits from a well planned programme of dairy development based on adoption of scientific techniques and provision of necessary services and inputs.

6.3.48 Poultry farming has certain distinctive features which make it an ideal subsidiary occupation for small and marginal farmers and agricultural labourers. It calls for relatively small land and capital base and can be raised successfully under all agro-climatic conditions in the country. It ensures quick returns from investment and regular income throughout the year. Organised poultry farming can provide supplementary occupation to a larger number of farmers and agricultural labourers in the rearing of chicks, production of eggs and transportation and marketing of poultry products.

6.3.49 Sheep rearing is a major rural occupation with certain farming communities and contributes a large part of farm income particularly in the sheep breeding tracts. As a subsidiary occupation it can easily be introduced in a mixed farming operation since sheep are well adapted to different agro-climatic conditions excepting heavy rainfall areas. Sheep rearing does not need any large investment and, therefore, offers good scope for development by small and marginal farmers and landless labourers.

6.3.50 Raising of pigs is, at present mostly in the hands of the backward classes among the rural population. Pig production could be made into a profitable subsidiary occupation for improving the economy of the weaker sections in the rural areas. A suitable programme to replace the non-descript pigs by improved types could ensure better income to the rural people.

6.3.51 Sericulture which include sericulture, mugaculture and production of *tasar* silk is another labour intensive subsidiary occupation which is highly important from the point of view of raising the income level of the rural poor. Both as agricultural activity comprising mulberry cultivation, seed production and silk worm rearing and as industrial activity covering cottage-based silk reeling and weaving, it could give additional employment throughout the year. Expansion of sericulture activity will, therefore, substantially benefit the poor farmers and the rural artisans.

6.3.52 Subsidiary occupation programmes organised for the benefit of the weaker sections in the rural areas will not succeed without the development of adequate infrastructure for production, processing, storage and marketing. Livestock and poultry production needs the support of a good marketing organisation. To be successful, the activities need to be based on commercial production and not on byproducts as in the past. For the success of the programmes, adequate research backing will be necessary.

The approach to a proper development of a massive programme of subsidiary occupations has been explained in detail in the Commission's Interim Reports¹ on programmes for small and marginal farmers and agricultural labourers.

6.3.53 Development of forestry and fisheries has considerable scope for creating additional employment opportunities for the rural people. As we have already observed, range management in extensive natural grass lands in the forest areas and pasture development on village common lands could have considerable socio-economic impact on the rural community in terms of creating opportunities for direct employment of rural labour and also providing the basis for development of animal husbandry in the rural areas. In the forest areas in particular, increased forestry activities, through intensive utilisation and marketing of forest produce, could provide sustained employment to the rural labour, both tribals and non-tribals, living in and around the forests. At present the collection, extraction and marketing of forest produce are mostly in the hands of private contractors, who appropriate bulk of the incomes denying a fair deal to the tribals and other workers traditionally engaged in these activities as their principal source of living. The benefits of expanded forestry activities should be made to accrue to the unemployed and underemployed labour by making suitable changes in the existing system of utilisation of forest produce. Either the State should directly take over the functions or create necessary organisations for the purpose.

6.3.54 Development of inland fisheries, by bringing in additional water areas under fish culture and increasing yields with the application of improved technology has the potential of creating opportunities for profitable employment. The technology developed for intensive fish culture, including induced breeding and the adoption of mixed fish farming practices, has made small scale operation of inland fisheries economically feasible. The aim should be to achieve maximum efficiency in operating water areas by an individual fisherman and his family or a small group of fishermen families. Programmes of intensive fish culture by fishermen families, who are among the socially and economically backward sections of the rural population, could substantially augment their income and raise them above the minimum need level.

6.3.55 The growth of a diversified agriculture will mean the develop-

1 Interim Reports on (i) Credit Services for Small and Marginal Farmers and Agricultural Labourers;

- (ii) Milk Production through Small and Marginal Farmers and Agricultural Labourers;
- (iii) Reorientation of Programmes of Small Farmers and Marginal Farmers and Agricultural Labourers Development Agencies; and
- (iv) Poultry, Sheep and Pig Production through Small and Marginal Farmers and Agricultural Labourers for supplementing their income. National Commission on Agriculture.

ment of animal husbandry, fisheries and forestry in addition to crop production, all of which need a rural service network including an appropriate marketing structure to support such growth. In the coming years, the income elasticity of demand for subsidiary foods such as milk and milk products, meat, eggs, fish, etc. is expected to continue to be high relative to cereals. Also, the potential for rapid growth in these sub-sectors is relatively higher than in the case of crop production. Development of these sub-sectors will provide employment opportunities, particularly to the small and marginal farmers and landless agricultural labourers, and enable them to earn additional incomes. Increased production of these subsidiary foods in the rural areas also adds to the nutrition level of the diets of the producers of these commodities.

6.3.56 Given proper training to appreciate and adopt modern technology in agriculture and allied activities including rural crafts and small scale industries, rural labour could increase their productivity and earnings. Provision of technical training to youths in backward areas is very essential to promote growth of agro-industries in large numbers and secure employment to the rural unemployed and underemployed. Rural employment policy should, therefore, have the objective of providing intensive training to the rural work force in all productive activities in which they are participating including the imparting of new skills in occupations in which they are traditionally engaged. In the rural areas, women have traditionally had a recognised role in earning livelihood for the family through their participation not only in the production but also in the marketing of agricultural produce and a variety of products of village and cottage industries. Female labour does a wide range of duties on and off the field such as dibbling, transplanting, weeding, harvesting, rearing of livestock and poultry, kitchen gardening, sericulture, composting, application of manures and fertilisers, grain storage, seed preservation etc. Their contribution to family income is, therefore, considerable. With the increasing emphasis now being placed on the adoption of improved agricultural practices, a sustained and more effective participation of rural women in productive activities is possible only through necessary orientation and training in the various functions which rural women will continue to undertake in and outside the farm. Illiteracy is no doubt a major impediment to the spread of knowledge among women. Emphasis should, therefore, be laid on the training programmes on promoting functional literacy among rural women so that the vast rural women-power could be effectively harnessed for improving rural life in general.

Rural-Urban Disparity in Growth

6.3.57 Lack of balance in the planning process has resulted in disparate development in income and living standards in the rural and the

urban sectors of the economy. A look at the contribution of the rural and urban sectors to the country's Net National Product over a period of twentyfour years will reveal¹ that, at 1960-61 prices (revised series), the contribution of the rural sector to the national product relative to the urban sector went down from 56·40 per cent in 1960-61 to 42·07 per cent in 1973-74. During the same period, while the rural incomes (at 1960-61 prices) increased by 62·05 per cent, or at 2·12 per cent per annum (compound), the incomes in the urban sector increased by 188·71 per cent, or at 4·72 per cent per annum (compound). The urban income, which was 0·77 times the rural income in 1950-51, increased to 1·38 times the rural income in 1973-74. In per capita terms, the rural income increased by only 4·64 per cent during this period (1950-51 to 1973-74) but the urban income increased by 49·17 per cent. In other words, in 1950-51, the national product attributable to one person in the urban sector was 3·70 times that of one person in the rural sector, in 1973-74 the urban product per person was 5·28 times the product attributable to a person in the rural sector. This is how the disparity between the rural and the urban sectors has increased over the years. Unless corrective action is, taken by changing the planning strategy for rural development, the rural sector as a whole will be at a disadvantage compared with the urban sector in sharing the benefits from growth in the coming years. This is essentially a problem of social justice as between the rural and the urban areas.

6.3.58 Bulk of the rural population in the country is unable to maintain a minimum level of consumption on the basis of employment and income opportunities available to them. While there has been a rapid growth of the labour force, the agricultural sector has been unable to provide employment opportunities to all those who are either under-employed or unemployed. And the current situation is that non-agricultural employment is enough to absorb not more than a fraction of that labour force.

6.3.59 A consequence of the inadequate opportunities for employment in the rural areas has been the increasing migration of rural labour to the urban areas. This is taking place because of a complex of factors. The motivation for migration is provided by the pressure of an inequitable agrarian system, the rural-urban income differential and lack of employment, absence of amenities and infrastructure and the attraction of lucrative urban employment and income. The result is that the number of job seekers in urban areas is increasing much faster than the number of urban employment opportunities. Open urban unemployment and massive

¹ In the absence of separate estimates of rural and urban incomes, figures of Net National Product from the agricultural sector and the balance have been taken to denote rural and urban incomes respectively as an approximation, for illustrating the point.

rural underemployment, thus, exist side by side. As long as rural living standards continue to be very low and the rural-urban income gap is not only large but also tends to widen, the migration to urban areas will continue aggravating the problem of urban unemployment. With the expected increase in the country's rural labour force (excluding children) by over 100 million by 2001 AD, a State policy that seeks to provide more urban jobs but does not adequately attend to the tasks of improving rural living standards and employment opportunities will only accelerate this migration and accentuate urban unemployment. The solution to the urban problem, therefore lies in solving the rural problem and the solution to the rural problem will have to be found mainly in the rural areas¹.

6.3.60 The State policy must be to force the pace of development in rural areas and achieve higher rate of growth in rural incomes. The failure to emphasise specific programmes for productive employment in the rural sector is at the root of the continuing problem of rural-urban differential in growth. In the past, there has been inadequate appreciation of the role of agriculture and connected rural activities in economic development. The only effective solution to the present rural-urban problem lies in emphasising programmes of rural improvement. There is an urgent need to formulate suitable programmes that will be of direct benefit to the rural areas, particularly small farmers and landless labourers. The policy of increasing rural employment opportunities and incomes requires to be vigorously pursued if the social objectives of development have to be realised in the foreseeable future. The expansion of employment has to take place both in agricultural and rural non-agricultural activities.

6.3.61 A slow-growing agriculture with a fast-growing rural population will only perpetuate the existing inequalities in income distribution between rural and urban areas. We have already stressed the need for re-orienting agricultural development programmes so that the gains from improved technology are widely shared. As agriculture gets modernised and moves towards a market-oriented economy, rural areas would need the support of wide range of service facilities such as processing, marketing, storage and transport, workshops for custom hiring, sales centres for input supplies, agro-industries and financing institutions. Much of these services are being provided from the urban centres. But, as we have already noted, rural growth in general, and improvement in the economy of the small farmers and agricultural labourers in particular, require that the services supporting such growth should increasingly be located in the rural areas where they are in demand.

6.3.62 The development of infrastructure and services should be planned around carefully selected growth points in the rural areas. The idea of

¹ *Ibid.*, 1 (p. 34): 13

growth centres as a strategy for rural development in this country has the objective of bringing about decentralisation of services and building up of the missing infrastructure at appropriate growth points to provide necessary linkages between these points and their rural hinterland. This process will bring about the widest possible dispersal of employment opportunities. The growth centres would not only help close the existing gaps in infrastructure—physical and social—in the rural areas but also help in promoting essential services to meet the present as well as the future needs of growth. These centres would become convenient locations for the establishment of various types of industries and the development of the services sector.

6.3.63 Processing and marketing facilities, which are at present largely concentrated in urban areas, operate to the detriment of the rural sector. Owing to the imperfect, and sometimes monopolistic, nature of the marketing services provided, the benefit of the price spread between the rural producers and the ultimate consumers is mostly appropriated by the exploitative urban market mechanism. It is not uncommon that middlemen and traders who render marketing services such as grading, transportation, storing and processing earn exorbitant return. In the approach to social justice, this aspect should, therefore, be put to a careful scrutiny and efforts made to shift the benefit of the price spread to the rural areas as much as possible. This is possible if processing and marketing are undertaken in the rural areas themselves.

6.3.64 The development of activities like processing, packaging, marketing and distribution in the rural areas will generate employment in the rural non-agricultural sector and help in the transfer of gains, at present accruing to the urban-based middlemen and traders, increasingly to the rural population. There are instances in foreign countries, as in Bolivia, where increasing stocks of agricultural output have come to be handled and marketed by a new class of small rural traders thrown up by the local peasantry having their roots in small towns and villages. The growth of such activities, preferably on cooperative lines, should be encouraged through deliberate State policy of providing the required organisational and financial support.

6.3.65 Diversification of the rural economy alongside agricultural development is the only means of diversifying employment opportunities and relieving the pressure of a huge labour force seeking to draw its sustenance from agriculture. Oil extraction, fruit processing and canning, ginning, dairying, wool grading and processing, utilisation and processing of minor forest produce are examples of food and fibre processing industries which can conveniently be located in the rural areas for increasing non-agricultural rural employment and income. Even the production of sophisticated goods and services, for which the demand will be growing, can

increasingly be located in the semi-urban and rural areas for the benefit of the rural people. It will be necessary for the State to develop adequate infrastructure to facilitate the growth of these industries in the rural areas.

6.3.66 Developing, improving and sustaining the traditional crafts and village industries also constitute important elements in the policy package for the diversification of economic activity in the rural areas. The development of these industries however demands an improvement in their technology based on which the productivity of rural artisans can be enhanced, their markets widened and the employment and income prospects increased. The growth of these industries and crafts thus serve a social purpose and has to be actively encouraged by providing necessary facilities and inducements.

6.3.67 The development of new industries whose markets are primarily in the rural areas, while creating opportunities for local employment will also promote local entrepreneurial skills. The agricultural prosperity brought about by the new technology in certain areas in the country, as in Punjab, has injected an element of enterprise in these areas and led to the growth of various servicing industries. A study conducted by the Administrative Staff College of India in East Godavari district of Andhra Pradesh has highlighted the possibility of locating new enterprises around pockets of surplus in agriculture. According to the study, prospective entrepreneurs are likely to emerge from among the existing functional groups of agriculturists, tradesmen, professionals and moneylenders in the district. Such enterprise is indicative of a growing awareness about economic opportunities which will facilitate a shift from traditional economic pursuits to new activities. This could provide the basis for modernising rural industries and diversifying the rural economy and create conditions in which part of the higher growth in secondary and tertiary sectors takes place in the rural areas and benefits the rural people.

4 CONCLUSIONS

6.4.1 The future policy of agricultural development should consciously attempt to combine social justice with growth. The main thrust should be on the creation of large scale opportunities for productive employment with a view to raising the level of incomes of the less privileged among the rural population through increased production. The accent should also be on the development of secondary and tertiary sectors not only to meet the increasing demand for rural services such as credit, transport marketing and trade etc., but also to increase the prospects of employment and income in the rural areas through greater diversification. Decentralisation of industries and services would be the means through which such a diversi-

fication could be achieved. Necessary support to rural crafts will be required for fuller utilisation of the local skills. Only such measures can tackle the problem of unemployment and underemployment in the rural areas as well as the problem of rural-urban disparity.

6.4.2 Both the agrarian structure and the institutional arrangements will require fundamental changes to enable the small farmers, tenants, share-croppers and the landless agricultural labourers to participate in the process of development and share its benefits. Land reforms must be considered as basic to ensuring growth with social justice. In the context of the predominance of small sized farms and low level of output, layers of intermediary interests sharing the small produce will only perpetuate poverty. Tenancy in such a situation is clearly untenable except perhaps in very special cases. State policy should be to encourage peasant proprietorship with necessary backing of supplies and services to derive the maximum benefit out of the small piece of land. Measures will have to be taken for fuller utilisation of the limited land area and for diversification of agricultural activities for sustained growth.

6.4.3 The concept of social justice has many facets. The policy instruments to achieve growth with social justice have to be varied and their choice will have to depend upon the peculiar needs of each situation. The policy should be to not only reduce inequality among the various strata in the rural society, but also among different regions by utilising the endowments of each region to the maximum. Necessary backing of research, extension and services will have to be provided for the purpose. Sufficient funds should be earmarked for research which should be directed towards evolving suitable crop varieties and practices for areas with different rainfall conditions so as to extend the benefits of scientific agriculture to more crops and areas. Special attention has to be paid to the vulnerable and backward regions which, because of their social, economic and political limitations and peculiarities, have so far been outside the mainstream of development in the country. In fixing priorities for development and deciding upon the pace of such development, due consideration should be given to specially backward areas. Development of infrastructure in such areas will need priority attention. Larger State assistance will be called for to activise these areas.

6.4.4 The amelioration of poverty in the rural areas cannot, however, be accomplished quickly. Complete eradication of poverty may yet be a distant goal. The availability of overall resources in the country sets a limit to the pace at which the disparities can be mitigated and ultimately removed. While every effort has to be made to continuously move in the direction of removal of poverty and inequality and reduction of regional imbalances, what may be feasible is to reduce the order of disparities between class and class and area and area. The agricultural policy must

be designed accordingly.

6.4.5 These considerations provide an important basis for the future agricultural development policy in the country. We have, therefore, kept these in view while formulating our approach to and making our recommendations later in this Report on the development of agriculture and the rural economy in India.

POLICY AND STRATEGY

1 INTRODUCTION

7.1.1 Agricultural policy in India in the beginning of the century had a colonial bias. The emphasis was in exporting food and raw materials to Great Britain. Increases on production during this period were secured through bringing more land under cultivation and extension of irrigation facilities through construction of major irrigation projects. Little attention was paid to increasing yields through research and extension. Emphasis was laid on agricultural research and education only after the Report of the Royal Commission on Agriculture. The main changes in agricultural policy since then have been discussed in detail in Chapter 2 on Historical Review. A brief account is furnished in this section.

7.1.2 In January 1946, the Government issued a Statement on Agricultural and Food Policy in India. The main goal of this policy was enunciated as: "To move the country away from the menace of famine to a new vigour and prosperity." The detailed objectives of the policy, the programme of action and the priority measures as well as others needed for attaining the objectives were indicated. The policy statement also laid down the respective responsibilities of the Central and Provincial Governments in carrying out the task.

7.1.3 The Grow More Food Campaign was initiated in 1942. This was later modified as Integrated Production Programme under which, besides foodgrains, cotton and jute also received attention. The schemes under the Integrated Production Programmes got, as it were, merged into the First Five Year Plan. The Community Development and National Extension Service Programme was started in which agricultural improvement was viewed as an integral part of economic and social development of village life. Intensive Agricultural District Programme (Package Programme) introduced in 1960-61 changed this strategy into one of emphasis on a package of practices in selected areas with potential for immediate response. Soon this approach was extended to more areas selected on a cropwise basis under the Intensive Agricultural Areas Programme, and in this process got diluted. Even then there was no emphasis on the application of science and technology to agriculture. It is only under the

new strategy of agricultural development, which was introduced in 1966-67 on a field scale, that adequate stress was laid on modernisation of agriculture through adoption of scientific inputs and associated improved practices. The need for growth with stability was realised and accepted in the Fourth Plan and in 1970-71 the objective of Growth with Social Justice was adopted as a major aim in agricultural development.

7.1.4 Similar strategies were adopted in the sphere of animal husbandry. Initially, the Key Village Scheme was taken up and was followed, in later years, by the Intensive Cattle Development Projects. In the new strategy for development of cattle and buffaloes crossbred cattle and improved indigenous cattle and buffaloes were multiplied through artificial insemination and the associated practices of feeding and better health measures were adopted. This resulted in higher milk yields. In regard to poultry, sheep and pigs also the process of modernisation was initiated.

7.1.5 In regard to inland fisheries, induced breeding techniques and mixed fish farming were introduced and the importance of better feeding to increase the yield levels was recognised. In the case of marine fisheries, mechanisation of fishing boats and development of infrastructure facilities were the two principal means through which the total catch was sought to be increased.

7.1.6 A national forest policy was enunciated first in 1894 and subsequently revised in 1952. In the recent past, emphasis was laid on the adoption of a more dynamic programme of production forestry. Plantations of fast growing species were started from the end of the Third Plan. Preinvestment survey of forest resources was also initiated in the recent past, facilitating integrated planning of development of forestry and forest-based industry. Ground has been prepared for introducing improved logging tools in forestry, by having personnel trained in their use in the Logging Training Centres established in 1965.

7.1.7 Apart from the aspects of production policy in the various sub-sectors of agricultural development referred to above, several other policies dealing with land, food, price, irrigation, mechanisation, credit etc. have been spelt out in the successive five year plans from time to time. These have also been referred to in Chapter 2 on Historical Review, but there has been no integrated agricultural policy statement by the Government of India in the post-Independence period. An attempt has been made to bring together, in this chapter, the various facets of agricultural policy as we envisage it. These have been dealt with in detail in the respective chapters. In formulating the agricultural policy and strategy, we have taken note of the views of the State Governments. During the visits of the Commission to the States, a broad measure of agreement was evident in respect of many important policy issues subject, however, to the local situations in individual States.

2 POLICY OBJECTIVES

7.2.1 Our approach to agricultural development rests on the basic aim of securing for the people of the country welfare and prosperity. The establishment of a prosperous and egalitarian society requires, firstly, adequate supply of goods and services to support a rising standard of living and, secondly, sufficiently employment and income opportunities for the masses which generate effective demand for these goods and services and enable them to enjoy the benefits of development. The agricultural development policy has to be so designed as to make the economy continuously move towards the attainment of both these conditions.

7.2.2 The main thrust of the policy should be to secure demand supply balance in various agricultural commodities and distributive justice over a period of time. Our appreciation of the demand situation in the time perspective of 1985 and 2000 AD clearly indicates the magnitude of the effort involved in matching the emerging demands with adequate supply of agricultural commodities. A rapid rate of growth in agricultural production, therefore, becomes imperative, and has to be planned for. In crop production it will be necessary to maintain continuously high rates of growth in yields as well as output required to achieve supply demand balance in 1985 and 2000 AD. In livestock, fisheries and forestry, the rates may have to be even higher. Production policies have to be framed as to make high growth rate possible.

7.2.3 In opting for a kind of development which seeks to continuously expand production. It is equally important that the demands of social justice are kept in view while achieving growth. A major policy consideration should be to secure the widest possible participation of the weaker sections and backward areas in the very process of growth. Employment policies have to be formulated in this context and should result in the reduction of disparity in levels of development and generation of enough purchasing capacity among the masses to enable them to reach the desired consumption levels.

7.2.4 Keeping these requirements in view, investment policies should seek to allocate resources within agriculture to simultaneously secure efficiency in production and generate maximum employment opportunities. The development pattern we are envisaging should ensure conformity of factor proportions with the labour surplus situation of the Indian economy. In order to ensure sustained investment in agriculture and rural development, mobilisation of rural savings and its investment in the rural economy will have to be organised.

7.2.5 Based on this approach, effort should be made to achieve an integrated development of crop production, livestock and poultry, fishery and forestry. The objective should be to bring about improvement simul-

taneously in all these fields of agriculture for a diversified agricultural base duly supported by marketing facilities and institutional innovations.

7.2.6 The need is to build a forward-looking and dynamic agricultural economy which creates conditions for continuously increasing production and efficiency. The production policy should be based on modernisation of agriculture in which adoption of technology is the most crucial input. The production policy should aim at a faster rate of growth to meet the demand for food and raw-materials for domestic consumption and industrial production which will rise due to both demographic and income effects. A rapid rate of growth will be necessary to impart the required stability to the economy.

7.2.7 A continuing expansion in production will also be necessary for creating surplus for export in raw or processed form and for import substitution since the continuity of economic progress requires a viable balance of payments situation. Import substitution and export efforts are recommended to increase saving and earn foreign exchange respectively to facilitate import of capital goods and scarce raw materials for the development of agriculture itself as well as other sectors of the economy. Production policy will have to be oriented towards reduction and elimination of imports of food and important agricultural raw materials and generation of surplus in commodities which have external demand. Increasing attention has to be placed on exploring export potential and developing the required capability for exports. The policy should be to identify new commodities and non-traditional areas for stepping up exports. Also, exports should increasingly be in the form of processed products. Greater emphasis on intra-regional trade would be called for.

7.2.8 Production activities should be organised on scientific lines to enable accelerated growth. In view of the non-availability of extra land area, the accent has to be on intensive use of land resources on modern lines. The real breakthrough in production has so far been due to technological advancement. It will be necessary to accelerate the process of gains through a strong research base so that intensive use of land is made possible through the input of technology.

7.2.9 The aim of policy should be to diversify the production base for ensuring availability of alternative foods including protective foods and raw materials and for increasing employment and income. For technical and agronomic reasons also diversification in crop production is advocated since the cultivation of land with the same crop in successive seasons is not conducive from the point of view of control of diseases and pests as well as maintenance of soil fertility. Apart from greater diversification in crop production, emphasis will have to be placed on simultaneous development of livestock and poultry, fisheries and forestry. As incomes rise, the demand for these latter products will be much greater and their supplies have to be

planned for. A much faster rate of growth is also possible in these sub-sectors. The development of subsidiary occupations like milk production, poultry, sheep and pig rearing and fisheries as well as forest production will be particularly useful for enlarging the employment and income opportunities of small and marginal farmers and agricultural labourers. A policy of diversified agriculture is also relevant in the context of enlarging the possibilities of exports and import substitution.

7.2.10 A well conceived food and nutrition policy has to be laid down to improve health and labour efficiency. Production policy should be nutrition oriented to ensure adequacy of food both in respect of quantity as well as quality. Norms of nutrition should be established for different population groups and different regions and production programmes should conform to these norms. The food materials which balance and enhance the quality of diet and are locally available should be preferred. Crop improvement and diversification programmes should have nutritional dimensions. In order to reduce nutritional deficiencies, much greater availability of animal protein will have to be planned for through livestock and poultry production and development of fisheries. Particular care should be taken at ameliorating the nutritional conditions of the vulnerable population groups. Simultaneously it will be necessary to restrict diversion of primary foods to industries for conversion into processed and sophisticated foods to such items only as are surplus so that the interests of the low income groups are adequately safeguarded.

7.2.11 Food distribution policy should be directed towards taking greater care of the low income population particularly in the vulnerable areas in the country. The drought prone and [flood affected areas should receive special attention in the distribution of food at fair prices.

7.2.12 There should be a positive slant in the agricultural development policy towards involving weaker sections and backward areas in the process of growth with a view to ultimately eradicating poverty. State assistance should be directed to help the weaker sections through promotional and protective programmes. It will be necessary to create special institutions to ensure undivided attention to their needs. The production base of small and marginal farmers and agricultural labourers as well as rural artisans should be strengthened and their production effort sustained and supported by the concentration of measures which improve their productive efficiency. The objective should be to ensure, through gainful employment, minimum incomes to the lowest levels of rural households within a reasonable time frame.

7.2.13 Much greater attention to the backward areas in the country like hill areas, tribal areas, low rainfall, desert and other drought prone areas, flood prone areas, etc. is called for. In these areas special

programmes are necessary to create facilities and harness the development potential so as to increase the levels of output, employment and income and thereby promote balanced regional development. These areas should receive due consideration in the allocation of resources for the development of the requisite infrastructures. In the cost benefit analysis for investments in these areas due regard should be paid to social returns.

7.2.14 An important policy objective of agricultural as well as rural development should be to reduce the widening rural-urban disparity. A higher rate of growth in rural incomes than hitherto should be the objective of State policy to reduce the increasing disparity in incomes between urban earners and rural earners. To achieve this objective, employment opportunities have to be diversified in the rural areas.

7.2.15 Since the transfer of labour from rural to urban areas through the creation of urban employment is likely to be slow, and the bulk of the rural labour has to be absorbed in the rural economy, it is necessary to expand and diversify productive employment opportunities in the rural sector itself. The basic policy to be pursued in this respect should be to absorb as much of rural labour force as possible in agriculture as well as in non-agricultural employment in the rural areas. As expansion of the agricultural sector is not likely to provide direct employment to the entire rural labour force, there has to be a definite policy to direct the location in rural areas of income generating production processes and occupations, hitherto-urban, in the secondary and tertiary sectors. Reservation of production of sophisticated processed foods and processed agricultural raw materials as well as several types of small industries for the rural sector should be an important ingredient of the policy.

7.2.16 An important aspect of employment policy should be to take away child labour from the employment market to prepare them, through education and training, for more fruitful participation in the development process when they come of age. The provision of productive employment to all the adult workers, who offer themselves for work, at reasonable minimum wages would be essential to reduce the number of persons below the poverty line.

7.2.17 The maintenance of ecological balance should be an important objective of agricultural policy. In trying to accelerate production and development in order to meet the demands of food, fibre and other objectives, care should be taken to see that the interference with the natural ecosystem does not lead to ecological regression and environmental degradation. The development and utilisation of resources should be so planned as to increase production potential without jeopardising the source of biological information. Greater accent has to be placed on using renewable forms of energy and economising on the use of non-renewable forms. Full use has to be made of recycling opportunities. A rural fuel

supply policy should be adopted to promote the conservation and recycling of all organic wastes. The policy should be to maintain ecological balance in a manner which improves continuously the production potential of the soil and to take measures necessary for preventing soil erosion and deterioration in soil quality. Further, the policy should be to promote harmonious development of plants and animals as well as harmony between terrestrial and aquatic systems of life. Wherever necessary, compulsion will have to be used to prevent loss or deterioration of the resource endowment. Keeping these requirements in view, considerable stress will have to be laid on programmes of research into environmental control.

3 MAIN ELEMENTS OF AGRICULTURAL POLICY

Land Policy

7.3.1 A reordering of the agrarian structure is necessary to lay the foundation for a progressive rural society. It should, therefore, receive very high priority in the development strategy. Keeping in view the main goals of policy, the land policy should be such as to ensure intensive utilisation of land, create widespread productive employment and reduce disparity. It should also induce changes in property relations and social structure in rural India with a view to enabling wider involvement and participation in development. The undue concentration of ownership and in the use of land should be avoided through a rigorous implementation of ceilings on both ownership and operational holdings. However, the current ceiling limits should be deemed to have been laid down on a long term basis and should not be disturbed for a sufficiently long period to encourage investment in land and production. Also, there should be minimum time gap between legislative enactments and their implementation to avoid aberrations so that there is sufficient stability to foster investment. The emphasis should be on personal cultivation to ensure adequate attention to land and for increased productivity and production. The agrarian structure should be based on peasant proprietorship strengthened and supplemented by cooperative and joint farm enterprises and backed by the necessary supplies and services for optimum utilisation of land. State assistance should be given, on a preferential basis, to the small cultivators who get together for joint farming. Leasing out should, however, be allowed by small owners within the size class of marginal farmers and in the case of exempted persons due to their special circumstances. In respect of others, all forms of tenancy and sharecropping should be abolished and the tenants and sharecroppers vested with proprietary

rights on a date to be specified by the State Government. Efforts should be made to detect all surplus land for distribution to the landless and marginal farmers, priority being given to the landless, particularly Harijan, tribal and backward communities. In this process, caution is needed against distribution of village common lands as part of the land distribution programme. It is necessary to preserve and utilise such lands for the general good of the village community and particularly for the benefit of the weaker section. The aim of policy should be to provide house sites to the landless who cannot be given land. They should be assisted to build homes and practise subsidiary occupations at the house sites. The area to be allotted for this purpose should be such as to enable the landless to practise an avocation like vegetable gardening, cattle, poultry, sheep and pig rearing, rural crafts, etc. Adequate institutional arrangements should be made for quick implementation of the land policy.

7.3.2 The consolidation of fragments of land holdings into compact areas should be an important aspect of land policy since this measure results in both operational economy and production benefits. In areas where land consolidation is undertaken, the land holdings of small and marginal farmers and the land distributed to the landless should be consolidated in compact blocks to facilitate the concentration of public investments in irrigation and land development exclusively for the benefit of the weaker sections. The creation of new fragments by transfer of a portion of land area by partition of a plot should be discouraged and transfer by sale etc. should be permissible only to the cultivators of contiguous land. The land consolidation programme should be given very high priority in irrigated areas and command areas of irrigation projects. For optimum results the programmes of land reform, consolidation of fragments, land development, irrigation and drainage should be integrated and executed in proper sequence.

Production Policy

7.3.3 Land use policy and cropping pattern: A primary concern of the land use policy should be to continuously increase the productive capability of land and to prevent its deterioration. Soil being the most important medium of plant growth, its management and improvement must permeate the policy of land use, soil conservation being looked at as integral part of programmes for maximising land use.

7.3.4 It is necessary to optimise the use of land by putting it to the best use as is consistent with ecology and the capability of the land and is justified by economic returns. Good agricultural land should not ordinarily be diverted to other uses, such as village *abadi*, factories, etc. For improving the environment and for meeting man's economic needs it is essential

that land use planning is based on a resource survey and production potentiality of the land. Assessment of land use capacity of the soils and the determination of the best use of land for different soil-climate zone should receive high priority. The cropping patterns should be restructured to suit the agro-climatic conditions and the crops shifted from low yield environment to high yield environment to obtain the maximum return from land. However, crop planning should be based not only on the agro-climatic factors but also on considerations of supply-demand balance. The restructuring of the cropping patterns has to be supported by a public food distribution machinery as a national policy.

7.3.5 An important aspect of policy should be to encourage diversification in land use by introducing in the cropping patterns crops like pulses, oilseeds and fodder. This is particularly relevant in low rainfall areas. Since the arable land area is limited, suitable land augmenting technology has to be developed which would enable intensive use of the land resource. Double and multiple cropping wherever possible should be encouraged. Although the scope for supplementing land by extension of area is limited, land reclamation and development should be undertaken wherever there is scope.

7.3.6 Mixed farming : For diversifying production, increasing return from land, employment and income and ensuring a balanced supply of food and fodder, the farmer should be encouraged to take to mixed farming, devetailing cultivation with subsidiary occupations like the raising of livestock and poultry, rearing of fish, silk worm and bee keeping etc. This would ensure year-round use of resources and labour potential of the farm family and the livestock.

7.3.7 Crop production : Crop development should be designed to secure early increase in the production of those commodities which are in short supply. The long term policy should be to restructure the cropping patterns based on rainfall and soil conditions to improve the yield as well as to bring about a balance between supply and demand. There should be an all India approach in this regard and it is not necessary for each State to be self sufficient in all agricultural commodities. The policy should be to grow crops which suit the rainfall, climate and other environmental conditions and can be justified on the basis of comparative advantage. The main policy regarding crops will be to evolve and apply technologies to secure substantial increases in yields. A major effort has to be made to encourage the growing of crops not only at appropriate places but also at appropriate times and with proper agronomic practices and the required backing of inputs and services. The area under fruits, vegetables, fibres and fodders should be increased in future in response to the growing demand. Apart from increase in the production in quantitative terms, it will be

necessary to improve the quality. Considerable emphasis has to be placed on research towards breeding for earliness, drought resistance or flood tolerance, resistance to pests and diseases, etc.

7.3.8 Animal husbandry development : The animal husbandry development policy should be based on the application of science and technology to animal production and should have the objective of diversification of the agricultural production base, improvement of human nutrition, provision of supplementary income to the weaker sections of the rural community and increasing the employment potential. The essential elements of the strategy should be to improve the productive potential of livestock and poultry including draught power of cattle, weed out inferior, uneconomic and surplus animals and arrange for provision of feeds and fodders only for the productive stock. Improved husbandry practices and better health cover should form important components of this strategy.

7.3.9 For improving the productivity of cattle and buffaloes, the policy should be to adopt scientific methods of breeding, to provide adequate feeds and fodders and animal health cover and to improve management practices. A close tie-up between intensive cattle and buffalo development programmes and dairy plants will be necessary for providing a ready market for the milk producers and ensuring remunerative prices. With a view to effecting progressive improvement in the milk yield a considerable proportion of the existing population of low yielding cows and buffaloes should be replaced with crossbred cows and improved indigenous cows, and improved buffaloes. In the milk production enhancement programmes, the approach should be to identify suitable areas and to undertake integrated cattle and buffalo development-cum-milk marketing projects.

7.3.10 The best policy for the development of dairying suiting Indian conditions would be to produce milk in the rural areas for supply to the urban consuming centres. Small and marginal farmers and landless labourers should be associated with the milk production programmes. Collection, processing and distribution of milk and manufacture of milk products should be organised, as far as possible, through cooperatives of milk producers themselves. The basic concept of this strategy should be to develop dairying effectively interwoven with the economy of the villages. A national milk grid with conservation facilities should be developed to even out seasonal and regional imbalances including rural/urban inequalities in milk consumption. The new policy should aim at self-sufficiency in milk and milk products and increasing the capability of export of finished and sophisticated products like baby milk food, milk powder, condensed milk, chocolates etc.

7.3.11 Sheep population should be multiplied at a faster rate. Large scale crossbreeding programmes by using exotic breeds of sheep should

be undertaken for rapid increase in wool and mutton production. For meeting the nutritional requirements of sheep, greater part of the arid regions should be utilised for range land and pasture development and natural pastures in northern temperate regions should be improved. Leguminous fodders should be included in the cropping pattern in irrigated areas and large blocks of government range lands should be developed mainly as grass reserves.

7.3.12 Marketing of wool and live animals in major sheep rearing tracts should be organised through sheep farmers' cooperatives and wool boards which should take up the responsibility of sheep shearing, wool grading and storage. Marketing yards should be set up for sale of live animals. A policy for realising higher trade balance in respect of wool and woollens should be followed. Its main features should be—(a) progressive restrictions on export of raw wool; (b) encouragement to export manufactured woollen goods; (c) close linkage of wool production and manufacture of woollen goods and woollen carpets with the schemes of a handicrafts boards/khadi boards functioning in the area and (d) simplification of the procedure of payments of drawback claims of duty on woollen goods for export.

7.3.13 Since goats cause considerable damage to natural vegetation, the basic approach should be to reduce their number to a manageable limit and stabilise it there. It is necessary to devise suitable management systems to exercise greater control over their movement and feeding habits. Goats should be kept out where soil conservation practices are being introduced. Lopping of trees for feeding of goats should be avoided and stall feeding of milch goats should be encouraged. The approach for raising meat production from goats should be selective breeding among taller and medium sized breeds and out-crossing nondescript types with select meaty type bucks. Crossbreeding with exotic dairy breeds of goats should be undertaken for increasing milk production. Milk capabilities of better indigenous dairy breeds should be improved through selective breeding.

7.3.14 The genetic make-up of the indigenous pigs should be gradually changed by introducing exotic breeds of boars. Intensive pig rearing areas should be developed around the bacon factories and pork processing plants. For organising production, pig producers' cooperatives should be formed and supply of quality pigs, and balanced feed as well as adequate health cover and marketing facilities should be ensured as a package. For giving encouragement to pig production, the bacon factories should adopt a pricing policy for pork and pork products which should be favourable to the producers.

7.3.15 The policy in poultry development should be to attain self-sufficiency in production of quality chicks and to augment production of eggs and poultry meat. This could be achieved through adequate supply

of poultry feed at a reasonable price and its quality control, proper marketing of poultry produce and by adopting appropriate breeding strategy. Areas where high standard of poultry husbandry exists, high producing strain-cross or in-cross hybrid chicks should be made available. For poultry farms in the intermediate stage of development, crossbred birds would be preferable. Medium sized crossbred birds, e.g., those obtained by crossing White Leg Horn with either Rhode Island Red or Australorp would be most suitable. For the rural areas with backyard poultry rearing practices, the most practical breeding programme would be that of grading up the local stock with improved exotic varieties. The crossbred males should be reared under semi-intensive or free range system so that they are not at a disadvantage when distributed in the villages. All indigenous cocks and cockerels should be replaced by crossbred males. Early action should be taken for licensing of all commercial hatcheries to avoid disease hazards. Producers' cooperatives should be organised for providing necessary inputs, as a package, to the poultry farmers.

7.3.16 In the field of animal health, the policy should be to develop an effective veterinary service to keep livestock free from hazards of animal diseases to ensure optimum production. For achieving this, the funds of the Veterinary Departments will have to be supplemented. A phased programme of levying a charge for the treatment of livestock including prophylactic vaccinations should, therefore, be introduced immediately. Further, it would be necessary to augment the effort of the Government veterinarians in protecting the health of livestock. Private veterinary practice should, therefore, be encouraged by providing suitable incentives to veterinarians. Biological production centres should be converted into corporations for giving them a certain degree of autonomy so that these could function with some freedom from the usual restrictions of Government rules and regulations.

7.3.17 Modernisation of slaughter houses is essential for producing healthy and wholesome meat. In order to provide necessary impetus for implementing this programme, the pattern of financial assistance should be changed. In the initial stages setting up a modern slaughter house should be regarded as a development activity and not as a commercial venture. There is considerable scope for building up an export market for buffalo meat especially to the countries in the Middle East. For achieving this objective, the meat characteristics of the buffalo should be improved. The export of meat and meat products should be brought under the control of some organised agency and the quality control ensured. An organised marketing service for meat animals should be established in the cooperative sector.

7.3.18 The overall policy should be to encourage dispersed development, each area specialising in the development of the livestock and poultry which

suit the environment. Each area must have a programme of increasing feed and fodder resources. Wherever necessary, controlled and rotational grazing should be adopted to allow for adequate regeneration of the grasses.

7.3.19 **Fisheries** : Development of inland fisheries should be undertaken as a priority industry to increase the availability of low cost animal protein. As Indian carps remain the mainstay of culture in freshwater, their seed fish supplies have to be increased several fold for undertaking increasing stocking densities to obtain optimum yield from all culturable waters. A major aim should be to make optimum use of water resources like ponds and tanks for fish production. For encouraging fisheries development greater attention should be paid to the requirements of small fishermen. Since water bodies are indivisible, small fishermen should be encouraged to form cooperatives for fishery development. Rights in culturable fisheries should be granted as outright leases on reasonable terms to enable utilisation of long term credit. Similar procedure should be adopted for waters under Government control. Since a large number of tanks and ponds are unutilised because of private ownership rights, the State Governments should take control of such water areas and utilise them for pisciculture. In regard to reservoirs in irrigation projects, the interest of fisheries should be kept in view right from the planning stage.

7.3.20 Marine fishery policy should be recast in the light of an exclusive fishery zone adjoining the coast. The accent on distant water fishing fleet should be replaced by more concentrated effort for the exploitation of the seas within 320 km of the Indian coast with emphasis on small and medium sized trawlers. The inshore fisheries areas and coastal creeks should be developed for higher yields through mariculture of prawns, molluscs and suitable coastal fishes. In marine fisheries also, the small fishermen should be given preferential facilitates in terms of fishing boats and gears and landing facilities. It will be essential to take necessary measures for delimitation of fishing zones through legislation in order to avoid conflicts amongst the non-mechanised crafts and mechanised boats and larger fishing vessels and between fishermen of adjoining States. Up-to-date information on marine fish stocks should be built up through comprehensive research. Oceanographic research will have to be intensified so as to develop fully the strategy to utilise the extended resources of pelagic fisheries beyond the traditional zone of exploitation of coastal regions particularly in the west.

7.3.21 Fishery development should invariably be accompanied by arrangements for storage so that the fishermen are not required to dispose of the catch at throw-away prices. In marine fisheries, infrastructural facilities like fishery harbours should be developed to support marine fishery development. In order to utilise fully the resources in the deep waters, it would be necessary to create infrastructural facilities in the public sector

which could then give the lead to the industry as a whole. A policy of developing specialisation in fishing boat building by a few yards should be fostered.

7.3.22 Special attention should be paid to crustacean fisheries, which have great export potential, by comprehensive survey of the resources, regular monitoring of the status of the fisheries and diversification of (a) production and processing centres, (b) exports products and (c) export markets. In this sector, small entrepreneurs as well as large business houses need to be encouraged as scope exists for both.

7.3.23 All aspects of fisheries activities and ancillary industries based on them need to be brought under uniform control. The Indian Fisheries Act of 1897 being outdated, it is necessary to enact a new fisheries act to cover all these aspects on an all India basis to confer enabling powers to the State Governments particularly in respect of prawn fisheries and others showing signs of depletion.

7.3.24 Forestry : In view of the increasing demand for forest based products, there is need for greater attention to increase the productivity of forests and their scientific management on modern lines. The national forest policy should rest on two pivotal points, namely, meeting the requirement of raw materials for forest-based industry and small timber, fuel-wood and fodder for the rural community, and satisfying the present and future demand for protective and recreative functions of the forests. All the requirements must be met in full and self-sufficiency achieved as early as possible. There should be not only a dynamic production forestry but also an extensive social forestry programme. Forests must have an adequate share of land, and no deforestation should be permitted without the approval of the State Legislatures. Since interdependence between forestry and forest industries sectors is vital, integrated planning for raw material production and forest based industry would have to be a major aim of future policy, and the required institutional changes should be made and infrastructure built up for the purpose. The price of the forest produce for the industries should be so fixed as to pay for the cost of clear-felling and plantations, and maintenance of production forests and leave a profit. Possibilities should be explored for cultivating plantation crops like rubber, coffee, cashew etc., in suitable localities on forest land to the extent that they do not interfere with the production of industrial wood.

7.3.25 The domestic needs of the people living near forest areas for small timber, fuelwood and fodder are primarily to be met from forests, mainly through widespread adoption of social forestry programmes which would lessen the burden on production forestry. Since free supply of forest produce to the rural population and their rights and privileges have brought destruction to the forests, forest produce

for the rural population should be priced reasonably.

7.3.26 Forestry programmes should encourage wildlife development and environmental balance. Some areas, carefully selected and distributed as to embrace varied natural conditions and ecosystems, should be devoted to the principal use of Nature and wildlife conservation.

7.3.27 Existing legislation on forestry should be strengthened and for the sake of uniformity and concerted action for forest development, a revised all India Forest Act should be enacted. Provision of employment of local people through forestry practices should be recognised as an important element of policy. Intermediaries exploit both the forests and local labour for their own benefit and must be supplanted by departmental labour force or forest labour cooperative societies. Keeping in view the requirements of forestry in future years, the national forest policy should be recast as explained later in Chapter 41 on Forest Policy.

Input Policy

7.3.28 Agricultural production based on modern technology requires all round institutional and infrastructural support. Integrated planning for the provision of the supporting services will be essential. The basic policy in this regard should be to offer support in a package consisting of inputs, credit, marketing etc., since the absence or inadequacy of any element is likely to impinge on the realisation of the full yield potential of modern technology. The institution of custom service should be firmly established so that inputs and technical advice, wherever necessary, are made available in time to the farmers. In providing support in terms of water, fertilisers, credit, marketing etc., special efforts and arrangements will have to be made for enabling small and marginal farmers to avail of them. The investment decisions of the State should be guided by such preferential considerations. This may imply the creation of infrastructure and institutions specially for this section of the farming population.

7.3.29 An area approach is required to be brought to bear on the development of infrastructure facilities. Irrigation development, command area development, soil and moisture conservation, milk production programme, etc. are examples which give best returns when developed on an area basis. The coverage of a viable area and a viable number of the farm population would then justify the expenditure on the infrastructural facilities. In building up these facilities on an area basis, there should be built-in provision for special assistance and attention to the weaker sections.

7.3.30 Wherever possible, community approach to the use of inputs should be encouraged. Community use of scarce groundwater, plant

protection on area basis involving groups of farmers are instances which bring about better economy in the use of resources and a greater measure of social justice.

7.3.31 Irrigation : In view of their insufficiency to meet the irrigation requirements in the country, the available water resources should be utilised with great efficiency and economy. Comprehensive river basin plans should be drawn up for the proper development of the land and water resources of the basins. Wherever feasible, surplus water in a river, such as in the Brahmaputra, the Ganga and the west-flowing rivers south of the Tapti, should be utilised in other basins where there is paucity of water. In drought areas, where there are precarious water resources, surplus water should be brought in, even at a sacrifice, from other basins which have better water resources. For this purpose and for better utilisation of surplus water in a river, there should be legal provision for the interbasin transfer of water by making the necessary Constitutional amendments.

7.3.32 Irrigation policies should aim at—

- (i) maximum production per unit of area through multicropping in areas with ample water resources;
- (ii) maximum production per unit of water in regions of medium and low rainfall in which a large part of the country lies;
- (iii) protection of maximum area possible in drought areas;
- (iv) irrigation of maximum area during the rainy season by supplementing rain;
- (v) maximum utilisation of irrigation supplies from storage during eight months of the year excluding summer when evaporation losses are the highest; and
- (vi) conjunctive use of surface water and groundwater.

7.3.33 Investigations of an irrigation project should be comprehensive and should cover not only engineering works but also command area development for utilising the irrigation supplies. It is obvious that unless the development of command area is also completed, full benefits cannot accrue from the project. All the steps necessary for the development of land in a command area should be taken together in an integrated manner as these cannot be carried out economically piecemeal at different times, and in some cases some steps if missed may not be feasible later. Consolidation of land holdings is an indispensable step if land formation is to be done properly. Within the command of a new outlet, the smaller holdings should generally be located at the beginning of the watercourse and the larger ones farther away to facilitate equitable distribution of water to the small holdings.

7.3.34 Wastage of irrigation supplies should be reduced to the minimum. Where night irrigation is not done by farmers, it should be enforced through the system of *warabandi*. The system of *warabandi*

would also protect the interests of the weaker farmers who otherwise may be deprived of their due share of supply during periods of keen demand.

7.3.35 Because of the high cost involved in their construction and the equipment and skill required for them, deep tubewells for groundwater development are best undertaken by the public sector. All other groundwater development should preferably be in the private sector. Jointly owned private tubewells, being more economical than individual wells, should be encouraged. The pre-emption of groundwater by individual farmers by sinking individual wells should be discouraged and if a farmer constructs a private tubewell which yields more water than what the size of his holding justifies, it should be permissible for the farmers having contiguous holdings to avail of their share of tubewell water on payment of share cost. In areas where groundwater is getting overexploited, the State must intervene and rationalise the extraction and distribution of water, through appropriate legislation.

7.3.36 Adequate water charges should be levied on the beneficiaries. In fixing irrigation rates, the overall consideration should be that, taken as a whole, the irrigation works in a State should not impose any burden on the General Revenues.

7.3.37 Seeds : Crop improvement programmes have to be adequately supported by the supply of good seed material. The basic policy in this regard will be to evolve suitable varieties of various crops and to produce enough quantity of seeds for extensive use. Simultaneously, production and sale of substandard seed material, which affect yield and undermine confidence of the farmers, have to be firmly controlled. For proper development of the seed industry, there should be division of responsibility among the research institutes, agricultural universities, National Seeds Corporation, state farms, Government departments and private seed growing agencies in the matter of multiplication and distribution of seed. Seed industry should be made an attractive enterprise to encourage production of adequate quantities for consumption and export thereby opening up new avenues of employment and income. It will be necessary to encourage small seed groweress to form compact areas for seed production where State assistance can be directed with greater ease and more effectively. An important dimension of the development of the seed business will be to make it competitive by throwing the business open to both public sector and private agencies. In encouraging multiplication and distribution of seed particular care will be necessary for ensuring quality through appropriate investigation and control arrangement.

7.3.38 Fertilisers and manures: Efficient and balanced use of fertilisers and combined use of organic manures and fertilisers will be essential for obtaining maximum potential yield and for the success of farming based on modern technology. The use of fertilisers should be governed by the

principle of optimising rather than maximising the dosage. This is necessary to enable extensive use at a lower dose to cover larger farming areas as opposed to intensive use in areas of high productivity so that the disparity in the economic conditions of the rural community is reduced and maximum production is obtained with the same resource. Special attention will be needed to overcome micro-nutrient deficiencies by developing suitable methods for incorporating them. There should be greater application of organic matters and wastes in order to permanently improve the physical and biological conditions of the soil for which recycling of processed waste in all available forms is a matter of urgent necessity. The production of chemical fertilisers has to be substantially stepped up to meet the progressively larger demand as modern crop production technology is adopted on wider scale. It will be necessary to plan for self-sufficiency in fertilisers since availability from international sources is often uncertain. Attempts should be made as soon as possible to change over to indigenously available raw materials in the manufacture of fertilisers. For meeting the requirements of high analysis fertilisers, straight/complex/compound, the fertiliser industry should try to develop appropriate technology so that fertilisers of higher efficiency could be made available to the farmers at a low cost. The distribution policy should include an aggressive promotional drive and seek to make fertilisers available in sufficient quantity even in the interior areas. The promotional measures should stress the use of balanced fertilisers. The distribution network should envisage stocking of fertilisers at intermediate points for quick transit and timely supply to consuming areas so that transport bottlenecks faced in supplies from factories to field are avoided. Strict quality control should be an important aspect of fertiliser policy.

7.3.39 Plant protection chemicals : Reducing crop losses should be an important objective of development. A policy of integrated pest control has to be adopted. This will include evolution of pest and disease resistant varieties, treatment of seed before sowing, prophylactic and curative spraying during the crop season, biological control and control of pests through agronomic practices. For optimum results, the adoption of pest control operations on area basis is essential and should be made compulsory with provisions to recover proportionate costs from the beneficiaries. In the choice of chemicals, those with greater risk of pollution should be discouraged. An important aspect will relate to the education of the farmers regarding proper use of pesticides.

7.3.40 Farm power: In the labour abundant situation in the country, the basic approach should be to meet the farm power needs by utilising, as a first priority, the available manpower and draught animals. Implements should be improved and used to gain better efficiency in man and animal power and to enable precise farming. The use of agricultural

machinery should be on highly selective basis and may be allowed to bridge the power gap in areas which exhibit a marked shortage of both man and animal power. In labour surplus areas, suitable control will have to be exercised to see that mechanisation is not resorted to for avoiding labour management problems and does not depress wage levels. In the course of agricultural development, the use of machinery should be so regulated as to facilitate continuous progress towards full employment. In certain non-repetitive land development work, mechanical support will be justified for undertaking heavy work and expediting development which will result in larger and sustained employment. Similarly mechanical and electrical support is also justified in irrigation.

7.3.41 Electricity: Electricity should be made available for energising pumpsets and for rural industries in practically all the villages by 1990. Supply of electricity for agricultural operations should be made on priority basis and uninterrupted and unfluctuating supply ensured. Special consideration should be given to the extension of electricity to fishermen colonies along the sea coast.

Supporting Services

7.3.42 Credit : The credit policy should be designed to provide an integrated agricultural credit service so as to facilitate the adoption of new technology, to extend its scope to cover all aspects of rural development including production, marketing, transport and processing, and to facilitate and provide linkages between finances and services for current inputs as well as investment in land improvement, minor irrigation and farm equipment. The guiding principle should be to finance individual enterprise or projects which have actual or potential financial viability. Where necessary, suitable organisational arrangements should be made to generate viability. The institutional and public resources used for such development must generate over an identified period adequate flow of income for the repayment of loan.

7.3.43 Considering the overall constraint of credit, due weightage will have to be given to the small and marginal farmers and agricultural labourers and rural artisans in respect of quantum of credit and interest rates. An important aspect of credit policy should be to help the farmers to reach self sustaining stage through the principle of graduation which would make them plough back their surpluses into agriculture increasingly. In providing credit to medium and large farmers their capacity to provide own funds should be kept in view.

7.3.44 For upgrading and modernising agriculture and efficient utilisation of credit by the weaker sections an integrated and supervised credit structure will have

to be built. This structure would consist of farmers' service societies (FSS) at the grass root level, controlled by the small and marginal farmers and agricultural labourers, which would be linked to a commercial bank or a cooperative central bank for necessary financial and management support. The FSSs should also encourage and finance viable units of suppliers of inputs, custom services, storage and transportation and marketing in their respective areas. All types of credit should flow through the single agency to ensure appropriate control and use. Increasing use of institutional sources should be made to find resources for large scale area development programmes like command area development.

7.3.45 Processing and marketing: To ensure reasonable returns to the producer and availability of the goods at reasonable cost to the consumer an efficient marketing structure has to be developed. In general, the farmer should get the marketing facilities within a radius of 5 km from the place of production. The existing weekly markets should be developed into assembling or sub-markets. New markets should be organised in areas brought under irrigation and areas of intensive production. The bigger markets should be regulated on a priority basis and the necessary amenities provided therein. All the agricultural commodities, which enter trade should be graded and those entering export trade should be compulsorily, graded and inspected. To ensure high quality of the processed products, improved processing facilities should be made available at places near about the centres of production. These processing and marketing activities should be organised, as far as possible, on cooperative basis, the primary cooperative marketing societies being linked with the commodity corporations such as those for food, cotton and jute.

7.3.46 Research, education, training and extension : The Scientific Policy Resolution adopted by the Government of India in 1958 emphasised that "the key to national prosperity.....lies in the modern age in the effective combination of three factors, technology, raw materials and capital, of which the first is perhaps the most important....." This applies to agriculture as well and, therefore, the scientific policy and in the field of agriculture should be, among others, to "foster, promote, and sustain, by all appropriate means, the cultivation of science, and scientific research in all its aspects-pure, applied and educational....."

7.3.47 The scientific agricultural policy will consist of, among others, an integrated approach to research, education, extension and training for all round agricultural development. The policy will be to create strong base for fundamental and applied research in universities supported by appropriate funding, reorganise agricultural universities on the principle of integrated teaching, research and extension education, demarcate the functions and responsibilities of agricultural universities and State departments vis-a-vis teaching, research and extension, develop appropriate

staffing pattern of technical personnel keeping in view the responsibilities and functions and train technical and administrative personnel of the departments as well as farmers. For the agricultural universities to be able to conduct applied research, regional research stations may be placed at their disposal at the rate of at least one per agro-climatic region. Central institutes should concentrate on research and not award degrees as this would defeat the very objectives of the institutes. Now that agricultural universities have been set up in good number, the training courses in research should be centred in the universities only.

7.3.48 The involvement of the scientists in the universities for extension on the farmer's field in the nature of demonstrations and intensive programmes should be limited. Every scientist in the university having a good research base should have direct contact with the field so as to get first hand knowledge of farmers' problems by placing highly trained extension subject-matter specialists in the respective divisions at the headquarters and each of the regional research stations. For this purpose each teaching department should be converted into a division with such integrated functions. For adaptive research by the State departments experimental farms which are usually meant for demonstration work and raising seed etc. should be placed exclusively under the control of such Government departments. These departments must have in their cadre qualified scientists to do adaptive research.

7.3.49 The State departments shall be made fully responsible for the entire field of extension functions in the States except for the limited involvement of research scientists to the extent indicated above. The programme, subject-matter and extension specialists at the State level shall maintain contacts with the specialists in the university divisions. At district and tehsil or taluk level, there should be a team of specialists in appropriate fields. To provide support to village level workers five to six graduate extension officers should be provided, in each block. In animal husbandry, there should be a graduate field extension officer at least at taluk level. In the district where special programmes are being undertaken in animal husbandry or fisheries, additional suitably qualified extension officers should be posted.

7.3.50 Considerable emphasis should be laid on national demonstration programmes for conveying research results to the farmers. There has to be greater emphasis on the pre-university and non-degree institutional programmes in agricultural education. Considerable stress should be laid on functional literacy-cum-education campaign for developing decision making ability among the farmers. Farmers trained under the farmers' education and training programmes should be involved in the extension process. These programmes should include the education of women in

rural areas also through a special curriculum which should emphasise the more technical aspects of subsidiary occupations, diet patterns, nutrition as well as population education. Training and involvement of the youth in the agricultural development will be an important policy objective. School curriculum up to higher secondary level should include basic elements of agriculture as part of general education to provide an agricultural orientation in the formative stage. Similarly, home science should be included as part of general education for both boys and girls up to lower secondary level.

Price Policy and Incentives

7.3.51 Price policy: The agricultural price policy should keep in view its impact on the general price situation and on the economy as a whole. It should be in consonance with the country's overall economic policy and should facilitate growth with stability. The major aim of agricultural price policy should be to correct distortions which are generally socially or economically harmful and which emerge from time to time because of the imperfections of the market mechanism. Being parts of the same policy, the interests of the producers should be safeguarded through price support operations when there is a sharp fall in prices, and the interests of the consumers, particularly the vulnerable sections of the population, should be protected through procurement and distribution of part of the marketable surplus at below the market price when there is a sharp rise in prices of basic necessities, such as cereals.

7.3.52 Reliance should not be placed on prices as a principal mechanism for augmenting production in a situation where there are overall shortages. Since such a policy adds to price rise without yielding higher production, the increases in output and the farmer's income will have to be brought about mainly through technological improvements and availability of crucial inputs rather than by manipulation of prices.

7.3.53 However, for encouraging investment in agriculture and for adoption of modern technology the assurance of a remunerative price to the farmer will be essential. A policy of offering minimum support prices for the principal crops must be followed. The minimum support price should be fair to the farmer and should cover his cost of production and leave him a reasonable margin of profit. Price fixation should take into account the variations in the prices of inputs. And the output prices should not generally be out of alignment for long with the package of input prices. The overall relationship between input and output prices within agriculture and the terms of trade between agriculture and other sectors of the economy should be such as to stimulate growth in rural areas. Index numbers of parity between prices received and prices paid by the

farmers both for domestic and farm expenses should be constructed so that a watch can be kept on the behaviour of the parity and corrective measures taken wherever the parity gets unduly against the farmer. Effort should be made to develop and use an index number system for the principal crops and take into account year to year changes in the costs of production.

7.3.54 Since the minimum support price is expected to take into account changes in input prices, widespread use of input subsidy as incentive to increase production should, by and large, be avoided except in the case of small and marginal farmers and difficult areas. In the latter case a transport subsidy will be in order. However, for promotional efforts in specific cases time-bound and tapering input subsidy will be justified. The minimum support prices should be fixed uniformly for the country. For special high cost areas, however, a differential price may be allowed but the difference should be limited to the cost of transport from the nearest area producing the same crop where the uniform price is applicable. In order to provide support to the farmers, commodity corporations and buying agencies should make purchases not only from the established markets but also from interior markets and producing areas as soon as the marketing season for a particular crop starts as this measure will particularly help the small growers. When prices tend to be low following a bumper crop, it is necessary for the purchasing agencies to make support purchases of surplus production in excess of the minimum demand and build a buffer stock which can be used to stabilise prices in lean years and for export. Adequate arrangements are also necessary for promotional purchase of new commodities in order to establish the cultivation of a new crop widely.

7.3.55 Public distribution of essential commodities will have to be a permanent or a semi-permanent feature of economic management in the country in the context of shortages. In such a situation, procurement prices of cereals have to be below the prevailing market prices in order to subserve the needs of the public distribution system. Since the issue price has to be related to the purchasing capacity of consumers with low income, the procurement prices, although higher than the minimum support prices, cannot be much above the issue prices minus the cost of distribution plus, at best, a small element of subsidy. In respect of commercial crops, the prices at which the commodity corporations and other agencies are to buy the crops should be determined after taking into account their impact on the domestic industry, the economy and exports. The principle of price support should be extended to livestock and poultry, fishery and forest products. We have dealt with the various aspects of price policy in detail in our Interim Report on Agricultural Price Policy.

7.3.56 Non-price incentives: As a general principle, no subsidy should be given for agricultural development programmes including distribution of inputs except to the weaker sections of the society and in difficult areas.

An integrated framework of policy for subsidy should be based upon the principles of selective application and subvention for those classes, sectors and key programmes that need support in the interest of balanced and rapid development and in keeping with the objective of growth with social justice. The possibility of introducing a system of crop insurance and insurance of capital assets to minimise the risk of the farmers need to be examined in detail and suitable arrangements made for its introduction. Pilot experiments now being undertaken should cover more crops in the insurance schemes especially foodgrains, in the different regions of the country. The policy of social and community recognition to innovating and enterprising farmers who have distinguished themselves by achieving greater productivity needs to be continued and its coverage enlarged.

Organisational Aspects

7.3.57 Farmers' organisations : For securing greater involvement of the farming community in agricultural development, a well-knit, strong and competent organisation of farmers, with units from the grass root to national levels, will require to be built up. The main tasks of this organisation would be, on the one hand, to motivate, educate and assist the farmers in scientific farming and in achieving the objectives and targets of various development programmes and, on the other, to apprise the Government of the problems of development and assist it in devising appropriate remedies and thereby safeguard the interests of the rural community and foster its growth. Adequate representation of the interests of the weaker sections and women on this organisation will be necessary.

7.3.58 Centre-State relations: Agriculture being a State subject, the major responsibility for agricultural development will be that of the State. However, Central role and leadership is, and will continue to be, important in certain areas of all India importance like provision of food for the country. Central initiative will be necessary to forge a national consensus and broad pattern of agricultural development. The Centre would have to take a number of developmental measures and create institutions which support State initiative and help in the effective execution of programmes by the States. Similarly the Centre may have to legislate for the country as a whole with the consent of the States, where a uniform policy has to be pursued throughout the country. Alternatively, it may have to make skeletal legislation to set the pattern for the country and guide the States. The Centre-State relations in the matter of agricultural development should be based on consultations, consensus, cooperation and complementarity to foster the discipline of national agricultural development, expand the area of mutual commitment and collaboration and ensure harmonious growth through both national and local initiative.

7.3.59 There are several aspects of agricultural development which may need compulsion in the interest of common good: For example, consolidation of holdings, soil conservation, land development, drainage, plant protection programmes, have to be organised on an area basis. If a majority of the beneficiaries agree, there should be provision making the participation of others obligatory and for undertaking the operations and realising the cost from all the beneficiaries. Further, in regard to fertilisers and pesticides, the quality control is important. Improved seeds need certification guaranteeing purity and germination. Food products need to be certified as hygienic from the health standard. For these also, appropriate legislation will be necessary. While, in general, regulation of crop acreages through legislation may not be practicable under Indian conditions, in some cases notifying certain areas for growing certain varieties of the crop, as in the case of cotton, and for prohibiting the cultivation of certain crops like tobacco in certain areas or potato in areas which are prone to diseases, may become necessary in the interests of agricultural production. Land reforms, minimum wages, restrictions on movement are other spheres in which legislation is necessary. In all these cases, it is desirable to have a certain amount of uniformity subject to local adaptation and modifications.

7.3.60 The Centre has to take upon itself the specific responsibility of ensuring all India priorities for the lowest level of rural households and the small and marginal farmers. For creating adequate opportunities of employment and income for this section of the rural population, an all India strategy of expediting the growth not only in crop production but also in livestock and poultry production, fisheries and forestry would be needed. Considering their importance, these programmes have all India importance for which the Centre has to take a large measure of responsibility to formulate the appropriate policies and guide the States in executing the programmes.

7.3.61 Agricultural administration : The administrative structure in the developing field of agriculture must be in a position to meet the requirements of the people as pressures of scientific agriculture develop and be capable of supporting the rapid but orderly movement towards modernised agriculture. The structure should be based on a single line of control from the State to the village level and technocrat oriented with emphasis on improving the technical competence of the administration and decentralisation of decision making responsibility and strengthening of field level organisations. An Indian Agricultural Service should be formed on an all-India basis to lay the foundations of a strong agricultural administration in the country, to facilitate exchange of expertise and experience and to provide career opportunities in an organised service with adequate prestige and status. The administrative structure should also facilitate the

planning of agricultural programmes from below with the district and the primary planning unit. Furthermore, administrative arrangements should be strengthened for the formulation and execution of a comprehensive programme of education and training exclusively for rural women and children.

4 STRATEGY

7.4.1 The main elements of policy stressed in the previous section are designed to promote growth, stability and social justice, and result in a continuous improvement in output, employment and income. These have to be seen in their totality because of their interdependence so that the implementation of these policies leads to coordinated development of the entire agricultural sector, and makes optimum utilisation of the available resources possible. In our view, the agricultural sector would then grow at a rate sufficient to sustain a high rate of growth of the economy as a whole. The strategies needed for integrated, rapid and sustained growth and development in different fields of agriculture as well as distribution of the benefits to the various sections of the community have been spelt out in detail in the respective chapters. However, the overall strategy for enhancing agricultural production should consist of the following important elements:

- (i) land and land use policy, which improves growth prospects;
- (ii) continuous improvement in yields;
- (iii) increased availability and efficient use of scientific inputs and credit;
- (iv) adequate support by research, education and extension for (ii) and (iii) above;
- (v) simultaneous attention to the needs and potential of growth in areas with different levels of development; and
- (vi) marketing and pricing structure which sustains this growth in production.

7.4.2 In the enunciation of the various elements of policy, as has been done in the previous section, there may be some apparent conflicts and internal inconsistencies among objectives and priorities. In the context of food shortages, higher priority for programmes designed to secure immediate increase in production through concentration of efforts in more favourable areas with assured irrigation might be justified. At the same time unless the problems of dry farming regions receive adequate attention, and the yield levels there are raised, the disparity in levels of income and employment would increase and impede progress towards the goal of balanced regional development. Further, quick increases in the production can be

achieved through medium and large farmers who are more innovative and who have the resources for adopting the new technology. But unless the small and marginal farmers are also enabled, through the provision of resources, to reap the benefits of agricultural modernisation, the disparities between the two groups of farmers will widen. Again, increase in the production of milk, poultry or wool can be obtained through relatively large or medium sized dairies, poultry or sheep farms; but, to achieve the objective of enlarging rural employment opportunities, measures are necessary to involve the small/marginal farmers in a large way in these programmes and also build up the necessary infrastructural facilities for this purpose.

7.4.3. Likewise, with the objective to increase marketable surplus to meet the urban demands and do away with imports, adequate emphasis has to be placed on increasing the production of the farmers who are likely to have larger marketable surpluses. On the other hand, with a view to bringing the small and marginal farmers above the poverty line, higher priority has to be given for increase in their production and consumption. Similar apparent conflicts are also likely to arise between the policies of mechanisation and employment, giving a higher incentive price to the farmer and assuring cheaper grains to vulnerable sections of the population and exporting oil-cake to earn foreign exchange and feeding it to the local livestock with a view to increasing their output.

7.4.4. We realise that in such cases it is not a straight alternative of choosing either one or the other strategy. What is needed in these circumstances is a careful examination of the implications of policy goals. The strategy should be to have a judicious mix of policies so that objectives are attained without detriment to either. Where resources are not limited and time factor is not a constraint, the strategy of development may encompass both irrigated and rainfed areas and all the farmers. But where capital is scarce, economic necessity and social preferences have to be suitably balanced to attain both economic and social goals. The relative priorities in the investment of resources in different fields have to be guided by such considerations and clearly laid down.

7.4.5. At the same time, it is clear that the various segments of the policy are inter-related. For sustained growth in the animal husbandry sector adequate feeds and fodders are necessary. The land use, crop planning and the cropping patterns should take note of the requirements and make due provision for their supply. Some of the uncultivated lands can be put under fuel trees or under grass or pasture development. In the allotment of land to the landless workers it is important to ensure that forest lands are not clearfelled and pasture and village common grazing lands are not allotted for cultivation. Thus, in this sense, the activities in the fields of development of crop production, animal husbandry and forestry

are complementary. Development has, therefore, to be viewed in an integrated manner.

7.4.6 We should also set out clearly the implications of the policy of growth with social justice. The acceptance of this policy implies that the requisite institutional structure should be developed to see that resources are provided to the weaker sections of the population and that necessary safeguards are built in to protect their interest in the structure so evolved. The structure, organisation and functions of the farmers' service societies recommended by us later are designed to achieve this aim. Furthermore, the pattern of investment should be such as would diversify and expand rural employment and income and reduce widening regional disparities.

7.4.7 In our Report, we have largely oriented our proposals to the long term perspective by the turn of the century; but at the same time, we have indicated the measures necessary in the immediate context of a shorter period, a decade. The medium-term and long-term aspects of policy, however, need to be viewed in their entirety. It is important that the instruments of policy adopted in a shorter run situation should not be completely at variance with those for attaining the long-term goals. While there is need for flexibility and continuous adjustments based on periodic review, too frequent and drastic changes in the policy structure will not be desirable also.

7.4.8 In concluding this chapter we would like to point out that in a span of twentyfive years, and in a world of fast changing technology and consumption pattern, there are many imponderables associated with the dynamics of development. The various trends in the growth process, which we anticipate, may be considerably influenced as new factors emerge. For example, increases in production are crucially dependent on technology and input. But there is little knowledge about the pace of research and adoption of its results in the field. Both these will condition the rate of growth in output. Again, the consumption pattern as well as total demand will be influenced by the overall development. Income changes may lead to shifts in consumer preference in directions away from what we have projected. There are also the effect of non-economic factors. All this would necessitate appropriate shifts in production. Similarly, there are many uncertainties in world markets. The export strategy will have to be flexible enough to meet the changing market situation. Thus taking note of the numerous variables, the policies and the strategies recommended in our Report may have to be periodically adjusted to facilitate rapid growth and desirable social change in accordance with the needs and possibilities.

CENTRE-STATE RELATIONS IN AGRICULTURAL DEVELOPMENT

1 INTRODUCTION

8.1.1 A national plan for agricultural development, based upon science and technology and aiming at optimum growth with social justice, has to utilise the production potentialities and the investment resources irrespective of the State boundaries and the formal distribution of power and responsibilities between the Centre and the States at any particular stage of development. Rapid modernisation of agriculture calls for continuous support of a wide range of developmental activities to be undertaken in the organised sector under the control of the national authority. Formulation and implementation of a national agricultural development plan in a federal set-up are associated with a number of problems on account of several factors—technical, economic, social and political. Viable Centre-State relationship has, therefore, become an increasingly important factor in agricultural development.

8.1.2 There are wide variations in agro-climatic conditions and factor endowments, input levels and institutional and administrative overheads over different States and regions. Balanced growth and development of agriculture based upon scientific land use and cropping patterns and regional specialisation may call for large-scale and concerted efforts including institutional and organisational innovations in which the Central Government and the national institutions may be required to play a pioneering role. Supply of inputs and other requisites of production including credit is scarce in relation to demand. These flow in many cases from centralised units of management or production. Central regulation and control over production, allocation and distribution of these supplies becomes necessary in the interest of optimum utilisation of resources. Similarly, foreign exchange needed for import of fertilisers and agricultural machinery is controlled by the Centre.

8.1.3 Besides, "food for all" is the accepted responsibility of the Centre, a position that is supported by the fact that imports of foodgrains and allocation of foreign exchange for the purpose are the direct responsibilities of the Centre. To cite another instance, Centre is also responsible for

importing fertilisers and allocating them to the States for production programmes, keeping in view the national priorities and the production potentialities of different regions. The new strategy for increasing production of foodgrains through the adoption of the improved inputs and practices has been formulated under the leadership of the Central Ministry of Agriculture and Irrigation. Recent experience has shown that a breakthrough in the different lines of agricultural production is dependent upon a strong research base. Central participation and initiative on a continuous basis are essential for the development of an integrated national research system.

8.1.4 Apart from these factors, the inter-State or indivisible nature of some of the projects or services and the limited technical, financial, institutional and administrative resources may prevent the States from undertaking them in the State sector, particularly in the initial stages. This kind of constraint may also be felt in case of new programmes especially those of innovative nature which the States may consider to be risky from their point of view. Similarly, the short-term gains in which the States may be more interested need to be suitably adjusted to the long-term priorities decided upon in the interest of growth. Besides, the functions of quality control and regulatory activities may have to be undertaken or supported in the case of a number of inputs and agricultural commodities at the Central level in the interest of standardisation and uniformity of treatment.

8.1.5 Centre is in a position to assess the progress of basic policies and significant programmes in different States and draw lessons that would be valuable for the entire economy. As is known, the intensive agricultural development programmes resulted in a number of imbalances such as regional disparity or neglect of dry areas, uneven spread of the new technology between crops and neglect of small and poor farmers. With the existing institutional and socio-economic structure, the programmes of development have tended to benefit the more privileged and better placed sections in the rural community. Systematic and timely identification of such imbalances latent in the growth process, and of the factors leading to them is a precondition of rapid economic progress with social justice. It is only through a national strategy of development that regional and group disparities can be effectively removed. An attempt to tackle the problem by individual States in isolation may have parochial stresses and could be even self-defeating from the national point of view.

8.1.6 Centre also acts as a clearing-house of information from one State to another. With the help of a comparative assessment of experiences and a perspective of the total economy, the Centre is in a position to develop comprehensive and objective appreciation of a number of important issues and problems. To illustrate, location of agricultural research stations or

setting up of an agricultural university could be cases where Centre may be in a position to take a more objective view. There can also be a number of coordinating functions at the inter-State and national level that can be handled effectively at the Central level.

8.1.7. Efficiency of production at the farm level and rapid rate of agricultural development depend on a process of planning and decision-making in which the Centre and the States will have to be cooperative partners. Centre lays down the basic plan and the policy framework with the active participation of the States. While the Central initiative and entrepreneurship may cover a wide range of activities touching upon various aspects of agricultural development including technical and financial assistance, the responsibility for actual execution of programmes rests entirely with the States and the administrative and extension agencies under their control.

8.1.8 The study of Centre-State relations in agricultural development, therefore, cannot be confined to the programmes and operations directly undertaken by the Centre or those included in the Central sector. The schemes or organisations directly administered by the Centre, occupy comparatively a minor place. The question of setting norms for Centre-State relations in the general field of agricultural development, totally within the State jurisdiction, is more complex and of crucial importance. To illustrate, administration and organisation of agricultural supplies and services including extension and credit facilities for the farmer are totally within the purview of the States. Still these and other development programmes in the State sector cannot be executed effectively without a firm commitment on the part of the Centre* in regard to the flow of various supplies and services including finance. In other cases such as implementation of land reforms, different land management legislation etc., the role of the Centre is confined to advice and persuasion. Thus a vast area is left to the operation of "leadership" and "influence" functions of the Centre. The point is whether there are more effective ways through which commitments of the Centre and States to the execution of these programmes which in many cases would be joint could be strengthened. It is only natural that the process of modernisation of agriculture should be associated with the expansion of the areas of mutual commitment and collaboration. Such a trend, if properly organised may encourage simultaneous growth of the national and local initiative.

8.1.9 The perspective of analysis outlined above will not be complete without a reference to what might be called the discipline of national

* "Centre" covers the apex financial and other institutions at the national level.

agricultural development. The obligations of an individual State implicit in the adoption of scientific cropping pattern or regional specialisation must be matched by strict observance of the principle of national sharing of agricultural surpluses, especially food. In other words, the discipline of a national agricultural development plan and that of national food budget are inseparable from each other. Surplus as well as deficit States have to recognise that procurement of marketable surplus is as much their responsibility as that of the Centre. A situation in which the States might be led to think that while production is their responsibility, procurement is that of the Centre, is likely to create complacency, and even defeat the objective of regional specialisation which presumes equitable distribution of surpluses.

8.1.10 It is, however, not possible to demarcate the powers and responsibilities of the Central and the State Governments in agricultural development on the basis of any fixed formula as due cognizance will have to be taken of the stage of development and the nature of the individual programmes and operations and the varying problems that might be thrown up in the course of development from time to time. In the process of development the centripetal and the centrifugal forces will operate simultaneously. We feel, therefore, that the norms for Centre-State relations should be developed in a long-term perspective laying down only the broad framework and the basic principles which may allow the powers and responsibilities to be equated at each level in keeping with the changing demands of development.

2 CONSTITUTIONAL POSITION

8.2.1 The Constitution of India (1950) lays down the distribution of legislative powers between the Centre and the States in regard to agricultural development. The relevant entries in the Seventh Schedule indicating the distribution of these powers are given in Appendix 8.1. In accordance with entry 14 of the State List under the Seventh Schedule "Agriculture, including agricultural education and research, protection against pests and prevention of plant diseases" is a State subject. Similarly, "Preservation, protection and improvement of stock and prevention of animal diseases; veterinary training and practice", "Protection of wild animals and birds", land and land tenure system and related matters, forests and fisheries are State subjects. Supply of water and related matters are State subjects but regulation and development of inter-State rivers and river-valleys is included in the Union List (entry 56). Under entry 18 of the State List relating to land and land tenure system States can enact legislation providing for ceiling on land holdings or to

limit the use of land for a particular purpose.

8.2.2 There are very few entries in the Union List that are directly related to agriculture. Entries in the Union List relating to inter-State trade and commerce, formation of the trading corporations (excluding cooperatives) and corporations with objects not confined to one State (except universities), cover a wide area of Central activities including formation of a number of statutory and autonomous bodies in the field of agricultural development. A similar provision in the State List (entry 32) is subject to the provisions in the Union List. At the same time, the Central powers relating to formation of trading corporations and inter-State corporations are not to be exercised in a manner that would affect the legislative powers of the States such as in regard to cooperatives. Otherwise the device of constituting a corporate body could be used to encroach upon many State fields.¹ Similarly, entries in the Union List concerned with scientific or technical education and research and coordination and determination of standards in institutions for higher education or research and scientific and technical institutions provide adequate scope for the growth of Central research and educational institutions despite the fact that education and agricultural and animal husbandry education and research are included in the State List.

8.2.3 Interestingly, entry 52 of the Union List relating to the control of industries in the public interest authorises the Centre to control, the production and marketing of certain agricultural commodities. The Acts governing Tea, Coffee, Rubber, Cardamom and Coir Boards contain a declaration that it was expedient in the public interest that the Union should take these "industries" under its control through statutory boards. Under entry 56 of the Union List, Centre can deal with development of inter-State rivers and river-valleys, only if it is declared by the Parliament to be in the public interest. A related provision is Article 262 of the Constitution under which Centre is competent to deal with adjudication of disputes relating to waters, under the Inter-State Water Disputes Act, 1956. The River Boards Act, 1956 which envisaged constitution of River Boards as advisory bodies for important river-basins was enacted under entry 56 of the Union List. The Act, however, remained a dead letter.

8.2.4 To mention some other provisions in the Union List, inter-State quarantine and fishihg and fisheries beyond territorial waters are within the Central purview. Banking and Insurance cover operations in the agricultural sector also. Centre can also impose controls on agricultural commodities in order to establish "standards of quality for goods

¹ This was the view expressed by Attorney-General of India Dec. 1967. Report of the Study Team, Centre-State Relationships Vol. III, Special Appendix. Studies of Seven Central Agencies: 43-44, New Delhi, Administrative Reforms Commission, Government of India.

to be exported out of India or transported from one State to another".

8.2.5 But it is primarily from the Concurrent List that the Centre derives its powers to intervene in the field of agricultural development. In the case of items in this list, Union Law would prevail against the State Law (Article 251) "Economic and social planning" appearing in the Concurrent List provides the legal basis for national planning in which both the Centre and the States play their respective roles in accordance with the emerging needs of development. "A national plan has necessarily to comprehend the entire range of developmental activities, cutting across the delimitation of powers between the Centre and the States. In this process, the Government of India and the Planning Commission have acquired a voice even in matters recognised to be within the Jurisdiction of the States."¹ Under Article 282, Central discretionary grants constitute a substantial portion of the resources for financing outlays on agriculture in the State plans.

8.2.6 Under entry 33 of the Concurrent List as amended under Third Amendment Act, 1954, Centre can legislate regarding trade and commerce and "the production, supply and distribution" of foodstuffs including edible oilseeds and oils, cattle fodder including oilcakes and other concentrates; raw cotton whether ginned or unginne and cotton seed and raw jute. Similar entries in the State List (26 and 27) are subject to the provisions of entry 33 of the Concurrent List. The Essential Supplies Act 1946 was replaced by the Essential Commodities Act, 1955 after the Third Amendment Act of 1954. It covers Central regulation of activities relating to production, supply and distribution, and of prices in respect of essential commodities mentioned above. Section 3(2)(b) of the Act provides for "bringing under cultivation any waste or arable land,....for the growing thereon of food crops generally or of specified food crops and for otherwise maintaining or increasing the cultivation of food crops generally, or of specified food crops." However, taking into account a total view of the different provisions of the Constitution, the Study Team of the Administrative Reforms Commission on Centre-State Relationships while examining the scope of word "production" occurring in entry 33 stated: "It appears to us that agriculture should administratively be treated as a State subject and that Central encroachment in the shape of the assumption of responsibility for substantive activity should not be permissible".²

8.2.7 At the same time the entry 33, as it is, provides a wide scope for a

¹ 1973. Report of the Finance Commission: 7. New Delhi, Ministry of Finance, Government of India.

² Report of the Study Team, Centre-State Relationships, Vol. I:164. New Delhi, 1967, Administrative Reforms Commission, Government of India.

number of permutations and combinations in Centre-State relations in the field of agricultural development. The Study Team of the Administrative Reforms Commission was of the view that the use of the term "production" under entry 33 needed to be clarified through a parliamentary review so that the responsibility in this field was clearly defined.¹ So far, however, there has not been any objection to Central initiative or enactments under this entry. The operation of the Essential Commodities Act has been confined essentially to regulation and control of supplies, distribution and prices of selected agricultural commodities specified under the Act. The Agricultural Produce (Development and Warehousing) Corporations Act, 1956, the National Cooperative Development Corporation Act 1962 and the Warehousing Corporation Act 1962 were enacted under entry 33 with the object of promoting development of cooperation and warehousing facilities in regard to items covered, under this entry. Under these Acts of 1962, the National Cooperative Development Corporation (NCDC) and the Central Warehousing Corporation (CWC) have undertaken important activities in fields within the State purview. However, implementation of programmes continues to be within the jurisdiction of the States. The Essential Commodities Act also provides for conferment of powers and responsibilities on the States allowing them to issue orders under the Act. The States are to play the key role in the actual administration of the Act.

8.2.8 "Price Control" is also one of the items in the Concurrent List (entry 34). Under it, Centre is empowered to fix maximum and minimum prices. These powers as already mentioned, are enjoyed by the Centre under the Essential Commodities Act, 1955 also. Legislative control of bankruptcy and insolvency is covered by the Concurrent List but "money lending and money lenders; relief of agricultural indebtedness" is a State subject. Accordingly, there is considerable scope for Central as well as State initiative in the organisation of credit facilities and assistance to State level cooperative institutions through the Central institutions. "Prevention of the extension from one State to another of infectious or contagious diseases or pests affecting men, animals or plants" (Concurrent List) was a carryover from the 1935 Act. The Centre also possesses concurrent powers to make enquiries and collect statistics in regard to any matter included in the Concurrent or the State List. Mention could also be made of some other entries in the Concurrent List like "Prevention of cruelty to animals" and "Adulteration of Food stuffs and other goods".

8.2.9 Certain general provisions of the Constitution are also relevant in this context. The residual power regarding any item that is not included in the three Lists goes to the Centre (Article 248). A State can further entrust to the Centre, functions in relation to any matter to which

¹ *Ibid.* 2, p. 95.

the executive power of the State extends (Article 258 A). Parliament is also competent to legislate in respect of a matter in the State List if the Rajya Sabha declares such legislation to be in the national interest with the support of two-thirds of the members present and voting (Article 249). Article 252 empowers Parliament to legislate on any matter with respect to which it has no legislative powers, at the request of two or more States. Such a law would, however, become operative only after its adoption by the legislatures of the States making the request. Parliament can also impose restrictions on inter-State trade, commerce or intercourse as may be required in the public interest (Article 302). According to Articles 256 and 257, compliance of the exercise of State executive powers with the Union Laws and the exercise of the power of the Union is ensured. The Union is authorised to issue directions towards this end. Finally, Part IV of the Constitution setting forth the Directive Principles calls upon the State "to raise the level of nutrition" and "to endeavour to organise agriculture and animal husbandry on modern and scientific lines" (Articles 47 and 48). Though not enforceable through Courts these provisions place a definite responsibility on the Centre in relation to agricultural improvement.

Constitutional Provisions : An Overall View

8.2.10 To sum up, taking a total view of the Constitution, while Agriculture including animal husbandry, forestry and fisheries is a State subject, the Constitution offers adequate scope for the Central initiative touching upon almost every aspect of agricultural development. The issue is not as to which provision of the Constitution has been used for supporting Central initiative or action in one or the other form, not even if the particular provisions have been interpreted more liberally to serve particular purposes. The efforts towards modernisation of agriculture involve a measure of Central initiative which could not be visualised at the time of framing the Constitution. That this has taken place within the framework of the Constitution and without any legal disputes, only proves that the flexibility of the Indian federal set-up could keep pace with the growing urges of development. Therefore, from the point of view of agricultural development, what is more important is the increasing interdependence of Central and State interests and the realisation that there is hardly any problem of agricultural development that can be solved without mutual cooperation and commitment between the Centre and the States. Therefore, problems of Centre-State relations in agricultural development in our view, are basically not due to any gaps in the constitutional framework and have to be tackled not through any realignment of the legal positions but mainly through consensus and better organisation and management.

3 PLANNING AND POLICY FORMULATION

Consultative Process in Planning

8.3.1 The broad outlines of national agricultural development plan and the discipline of national agricultural development having been accepted by the States and the Centre after due discussions, a structure for the implementation of the accepted programmes becomes necessary. In Chapters 60 and 62 on Planning and Administration respectively the details of such an organisation have been worked out. This structure is based on the broad division of responsibility between the Centre and the States for implementation of the agreed programmes, but assumes that the basic technological and administrative support to the programme is available in all the States and at the Centre in the desired measure. Historically, the agricultural organisations in the country started from the Centre and moved into the States, as the coverage increased and development began to spread in all corners of the country. After independence, there being the need for reorganisation of State boundaries and for forming new States and Union Territories, the uniformity of basic competence and capacity has not developed in all the areas of the country in equal measure. This necessitates that the Centre which has over the decades built up a competence in planning and technological expertise, does support and develop the planning and technological expertise in the weaker areas. Till the capacity develops, the Centre may have to play a much more direct role in the planning and technological support in such areas than what the broad division of functions postulates.

8.3.2 Policy in a fast changing field, like agriculture, cannot be laid down for all times. The very need for a national development plan arises out of the need to adjust the exploitation of the agricultural potential to deliver the types of produce and the amounts thereof, to support the varying need of both internal consumption and export over the years. The planning units recommended in Chapter 62 on Administration, will have to be the vehicles for a continuous appraisal of both the changing needs and the available opportunity at any point of time. The chain of such units from the district to the national level will have to be the channel for discussions leading to the development of consensus for adjustment of the policy frame from time to time. This process of consensus in national planning in the field of agriculture cannot be constrained by the theoretical division of administrative function between the Centre and the State by the laws of the land, if national potential has to be used to the best effect to meet the national demands at any point of time.

8.3.3 Till now the main instrument for arriving at this consensus has been working groups in various disciplines formed at the Centre and in the States at the time of the preparation of a five year plan. For annual adjustments of the plan to meet the changing requirements and situations, the instrument has been the annual plan discussions between the States and the Planning Commission. Even after the formation of the planning units in the States and the Centre, the method of working groups and annual plan discussions will be necessary for arriving at the consensus.

8.3.4 For the preparation of the Plan, the States form a number of working groups to deal with the important disciplines in agriculture. These working groups send up the States' assessment of priorities and the need for funds to the Central working groups in the relative disciplines. The national plan for agriculture and the State plan are worked out through a suitable adjustment of the recommendations of the various working groups at the Centre both in regard to targets as well as outlays. The main problem has been the need for representation of the State experts on the working groups at the Centre as against the desirability of limiting the number of members in any working group so that a reasonable consensus can develop. There can be arguments on both sides, but the need to limit the number of members to a workable level must ultimately prevail. Choice of membership will obviously be based on competence of the person to advise and not on regional pulls.

8.3.5 The main difficulty in formulating a national plan for a discipline by a working group at the State level and in the Central working group, dividing the responsibility between the States meaningfully and in keeping with the priorities, is the inability to tie up at the stage of planning the financial frame for the exercise. Theoretically it would be desirable if the financial exercise is done first and all are informed within reasonable margins the amount of finance they can expect for any particular discipline is the agricultural plan. However, the difficulty of forecasting the financial position in the main reason why an annual exercise has to be done to adjust the plan to realities of finance and performance. Under these constraints, it is suggested that there should be a continuous dialogue between the State and the Central working groups till the finalisation of the plan so that adjustments made because of possible financial constraints by the Central working group are within the general acceptance of the State working groups and their appreciation of priorities and implementing capacity. This process will be continued at the annual plan discussions so as to make further adjustments in the light of the changes in financial resources and demand that may occur in the interim and the realities of performance. With

the setting up of planning units at all levels, such a continuous dialogue can be organised through these units so that decisions taken have semblance to field realities.

Planning of Central and Centrally-sponsored Sectors

8.3.6 The States also need to be closely associated with the formulation of the Central and Centrally-sponsored schemes. The outlay on Central and Centrally-sponsored agricultural programmes constituted 11.4 per cent of the total outlay on these programmes in the Third Plan. The corresponding percentage during the Fourth and Fifth Plans are 45.1 and 43.3 respectively (Para 8.4.1.). However, as explained later, a large number of schemes in the Central sector, in addition to those in the Centrally-sponsored sector are to be implemented through the State agency or with their assistance. A number of other programmes in the Central sector which are closely tied up with the State sector are designed to create "infrastructure for different schemes in the State Plans or to improve the efficiency of the corresponding sectoral programmes in the State sector" or fill the "crucial gaps" in the State Plans.¹ When such large outlays are to be incurred in the Central sector, basically with a view to innovating and supporting State action, the States should naturally be given full opportunity for participating in the process of formulation of the Central and the Centrally-sponsored schemes. At present, the Central and the Centrally-sponsored schemes are formulated by the working groups at the Central level with which the State representatives are not formally associated. These are finalised primarily on the basis of discussions between the concerned Central Ministry and the Planning Commission. Greater involvement of the States in the formulation of these programmes will help in establishing proper linkage between the State and the Central or Centrally-sponsored sectors. The States would be better committed through this process to take complementary action in relation to these Central and Centrally-sponsored schemes. Therefore, programmes to be included in the Central sector which are closely tied up with the State sector and the Centrally-sponsored schemes should be finalised through joint working groups consisting of the Central and State representatives.

8.3.7 The Central assistance for State Plan schemes is allocated on the basis of objective criteria consisting of population, per capita income, etc. which were decided upon in 1969 and is being up-dated for each plan. The Centrally-sponsored schemes, on the other hand, are of a pilot nature and aim at filling in gaps in States' capabilities in any

¹ Fourth Plan: 123

particular field and deal with special problems of a State which are not universal in the country. Therefore, the allocations for these schemes have to follow the need criterion and not the overall distribution pattern. The Central sector schemes are based on the priorities in discharging the Centre's responsibility in the field of agriculture and related discipline and as such cannot be constrained by a call for, what may be called, a fair share of all the States. At the same time, in order to make the allocations acceptable to the planners, involvement of the State representatives in the Central working groups for the Centrally-sponsored schemes and Central sector plans without making them unwieldy is recommended.

Some related Aspects of Planning

8.3.8 Turning to another aspect, there has to be a closer integration between the plan and the budget at both the Central and the State levels. Plan allocations decided in the course of Annual Plan discussions at the Central level may not be fully reflected in the State budgets, as the budgets of the States might be finalised before the annual plan outlays are decided upon. This is also possible when the States divert funds in the budget in deviation from the priorities approved in the annual plan. Although "agriculture" is a tied sector under the revised procedure of Central assistance, such diversions could take place from one head of "agriculture" to another. Besides, the Centre may decide to make additional allocations to the States on account of special circumstances during the course of the plan and after the finalisation of the annual plan, necessitating recasting of the budget at the State level. The needed tie-up between plan and budget can be secured to a great extent through planning units at the Central and the State levels. These units as explained in Chapter 62 on Administration will be working in close harmony with the budgetary cells. This will for instance, ensure that savings or shortages of funds or economy cuts are distributed over different schemes, rationally and in time.

Policy Formulation

8.3.9 The process of plan-formulation is closely related to the process of policy-formulation. Policies are the instruments through which the objectives of the Plan are to be realised. Policy formulation in the comprehensive sense is a phase of the planning function. In the first place are the basic policies and approaches such as growth with social justice, self-sufficiency in food production, approach towards agrarian structure etc. Within the framework of these basic policies and objectives are the detailed developmental policies or the current policies

covering a wide range of issues such as supply of inputs and credits, land reform measures and land management legislation and regulatory measures, detailed strategy of production for specific regions and sector of development etc. Excepting in cases such as control of prices, ensuring overall availability of critical inputs, credit, foreign exchange and finance, the responsibility for implementing the various developmental policies is entirely that of the State. In addition, there are a large number of detailed issues of administrative nature on which the national authority has to provide guidelines, even though the subjects lie entirely within the State jurisdiction. For instance, functions of the village level worker, administrative structure at the local level, the role of panchayati raj or cooperative societies in the organisation of production programmes are some of such detailed issues on which guidelines have been provided by the Centre. The advice and the guidance provided by the Centre on such issues have vitally affected the course of action adopted by the States. It is with regard to the detailed developmental policies and issues of administrative nature that the role of the Centre needs to be clearly defined.

8.3.10 Centre has a genuine role in laying down the broad framework of developmental policies and providing guidelines on some of the basic issues connected with the administration of programmes. It is in a position to collect, assess and evaluate information and experiences from different States and provide norms or performance in various fields for guidance. This will facilitate timely and uniform action in the implementation of programmes. Centre can also bring the national priorities into consideration while taking decisions on these issues. In the case of developmental policies such as price policy, land reforms measures, consolidation of holdings, organisation of supplies etc. there has to be a more definite framework of action at the national level to which both the Centre and the States may be committed. In the case of issues connected with the administration of programmes, the Centre's recommendations should lay down only the broad norms taking into consideration the problems peculiar to a particular State or region. Further, the alternative approaches to a problem with their implications should be fully spelt out so that the States are able to take their own decisions adapting the general guidelines to local conditions.

8.3.11 The planning process and the Central financial assistance to the States in different forms offer opportunity to the Centre to influence the decisions on these issues at the State level. The Central role in this regard is, however, purely normative and the States are free to take their own decisions. The question is whether there are ways through which implementation of these policies and decisions especially those

of national importance could be improved through an agreed framework of action between the Centre and the States with due respect to the individuality of the State Governments. The issue is considered in the subsequent sections.

8.3.12 A number of steps need to be taken in order to improve the process of policy formulation. The basic approaches and other significant aspects of the developmental process will have to be evaluated on a regular basis and the results or evaluation will have to be fed into the policy-making process. In order that shortcomings of one or the other approach are boldly identified, it would be desirable that apart from Central evaluation bodies like the Programme Evaluation Organisation, evaluation through autonomous bodies like the agricultural universities and research institutes is fully encouraged. In a large number of cases, recommendations or decisions may have to be finalised within a very short period and it may not be possible to wait for the results of evaluation through autonomous bodies. In such cases, evaluation through the proposed planning units at the Central and the State levels which will also be responsible for concurrent evaluation/ progress analysis will be helpful. Evaluations at the national level will be supported by more specific appraisals at the State and the local levels. Feedback from the State to the Central level can also be facilitated through close contacts between research and developmental organisations under the Central control and those under the State Governments.

8.3.13 In addition, a number of other measures suggested in Chapter 62 on Administration (sections 3, 4 and 5) will be of considerable help in improving the process of policy formulation. These are constitution of Agricultural and Rural Development Council at the State level and a standing consultative Council under the Central agricultural set-up, activation of the advisory bodies and panels, decentralisation of decision-making, and training in agricultural administration and management and economic decision-making. Besides, professional dialogues between the Central and the State level should be fully encouraged. Such dialogues should be sustained and should invariably precede the deliberations in advisory bodies and development councils. The farmers may be duly represented on advisory bodies and panels, development councils and consultative bodies where such representation is helpful.

8.3.14 National policies not only in the agricultural sector but also in other sectors having bearing on agriculture, such as power and industries may affect the efforts of the State Governments towards increased agricultural production. Deliberate efforts should, therefore, be made to seek the reaction of the State Governments on these policies. The

consultative council under the Central agricultural set-up could be the appropriate forum for this purpose.

4 CENTRAL AID AND ASSISTANCE

Central and Centrally-sponsored Sectors

8.4.1. Central aid and assistance in various forms—grants to State Plans, Centrally-sponsored schemes or even schemes included in the Central sector—continue to be a key factor determining the Centre-State relations in agricultural development. The provision for agriculture and allied programmes in the Central and Centrally-sponsored sectors as well as in the State sector in the Second, Third, Fourth and Fifth Plans has been as follows :—

				(Rs in crores)
	Second plan	Third plan	Fourth plan	Fifth plan
1. Centrally-sponsored sector	0.07	28.50	126.83	370.00
2. central sector	46.58	96.50	1104.26	1770.00
3. total central plan	46.65	125.00	1231.09	2140.00
4. state plan	482.55	965.21	1497.09	2801.76
5. grand total	529.20	1090.21	2728.18	4941.76
percentage of central plan to grand total	8.8	11.4	45.1	43.3

NOTE— 1. Agriculture and allied programmes do not include major and medium irrigation and flood control.
 2. State sector includes Union Territories.
 3. Second Plan figures are actuals.
 4. Fifth Plan figures are based upon draft Fifth Five Year Plan, 1974—79.

In the past, when Central financial assistance was given to State programmes on a scheme-wise basis, the States could not re-appropriate funds from one scheme to another without the approval of the Central Government. The procedure was unduly restrictive and involved considerable delay in sanction. It was relaxed in 1958 when scheme-wise sanction was dispensed with and Central assistance was related to composite heads of development such as Agricultural Programmes, Community Development and Cooperation etc. Since 1969-70, Central assistance for State Plan schemes is provided in the form of block grants and loans and the manner of utilisation of Central assistance is left to the discretion of the States, even though outlays under Agriculture and specified continuing major irrigation schemes etc. are earmarked. While the Central grants are no longer tied with individual heads of development in the State sector, larger provision has been made for Central and Centrally-sponsored schemes with the aim of protecting

the national priorities and supporting the key sectors and activities. In terms of outlay provided in the Central and Centrally-sponsored sectors of the Fifth Plan, the main burden of development in a number of important areas such as agricultural research and education, command area development, dairy development and milk supply, agricultural credit and marketing, storage and warehousing, food processing, building up of buffer-stocks and special programmes of rural development would appear to have fallen upon the Centre. In the case of some other programmes such as cooperative development, fisheries and animal husbandry it has been assigned a pivotal role. In the case of commercial crops and soil conservation, the provision in the Central Plan is primarily in the form of Centrally-sponsored schemes. Centrally-sponsored schemes also occupy an important place in the field of cooperation and animal husbandry and dairying.

8.4.2 The criteria for introducing Centrally-sponsored schemes are: (a) that they should relate to demonstrations, pilot projects, surveys and research; (b) they should have a regional or inter-State character; (c) they should require lump-sum provisions to be made until they could be broken down territorially and (d) they should have an overall significance from the all-India angle.

8.4.3 An enhanced provision for the Central sector schemes should not be construed to mean that the Centre has taken upon itself the responsibility for implementing all these programmes. In a large number of cases, provision in the Central sector as in the case of Centrally-sponsored sector is actuated by the need for providing assistance on an earmarked basis for programmes or Institutions that are basically part of the State sector and the responsibility for implementing them falls upon the administrative and extension agencies under the States or autonomous bodies and institutions under them. The Central sector schemes can be classified as (a) assistance to State Governments or direct assistance to autonomous bodies and institutions operating at the State or even field level with a view to achieving certain basic objectives of national importance and development of key sectors such as assistance for Small Farmers' Development Agency (SFDA)/Marginal Farmers' and Agricultural Labourers' Development Agency (MFAL), Drought Prone Areas Programme (DPAP), Command Area Development Programme etc., assistance to agricultural universities and share capital contribution to Agro-Industries Corporations etc.; (b) Centrally-managed autonomous or other organisations having a directly supporting or complementary role in relation to State programmes such as the NCDC, Central and State Warehousing Corporations, Agricultural Refinance Corporation (ARC), National Seeds Corporation (NSC) and State Farms Corporation; (c) operations involving collaborative

efforts or joint participation between the Central and the State Governments as in the case of the all-India coordinated research projects and (d) projects and institutions that are Centrally-managed and executed on account of functions that are the direct responsibilities of the Centre. It is pertinent to observe that most of the plan provision in the Central sector in the draft Fifth Plan is in respect of schemes implemented through the State Governments and administrative and extension agencies under them or autonomous bodies and agencies in the State sector. Nevertheless the Central responsibility in the implementation of these Central and Centrally-sponsored schemes is much greater.

8.4.4 Proper correlation between the Central and Centrally-sponsored sectors and the State sector, therefore, assumes crucial importance. A long-term perspective has to be developed in respect of the Central and Centrally-sponsored schemes being implemented through the State agency and a strategy has to be followed under which these schemes ultimately form part of the State sector. The object of these schemes as already stressed, is to arouse State initiative and cooperation and imbibe in them greater sense of self-reliance. Though conceived as a temporary support to the State sector, States have in actual practice accepted these schemes, more or less, as a permanent feature of their Plan. It follows that the number of such Central and Centrally-sponsored schemes should be kept to the minimum.

Earmarking of Funds for Priority Sectors

8.4.5 The need for earmarking resources for priority programmes and key sectors of development is, however, accepted. But earmarking of resources can be secured even while such programmes form part of the State sector. The Central funds can be earmarked on a matching principle without insisting upon Central financial sanctions. In other words, States cannot divert funds (including the funds provided from the State Plan) from the earmarked sectors and programmes and Central funds could be released or expenditure sanctions issued on the basis of figures of expenditure reported by the States with provision for advance payment wherever necessary. Thus after the schemes are included in the plan and their details are worked out in consultation with the Centre, it will be for the States to issue sanction for these schemes. After setting off advances, the balance of funds will be released by the Centre yearly, for all such schemes together for a particular State after being satisfied that the actual expenditure/estimate of expenditure is on the earmarked basis. Such earmarking, however, should be restricted to the essential and minimum number of programmes. In order that the States follow the desired priorities and schedule of work, it is necessary that a working programme giving all programmatic

and administrative details should be prepared by the States on the basis of broad guidelines provided by the Centre. The detailed working programme prepared for the plan period will constitute a kind of agreement between the Centre and the States for the implementation of the plan. Such an agreement can also take the shape of a written Memorandum of Understanding.

Ad hoc Central Assistance

8.4.6 In addition to schemes included in the plan, there were certain other schemes for which funds were provided during the Forth Plan outside the State Plan ceiling. With the aim of retrieving the losses in *kharif* season and increasing the production of *rabi* and summer crops, an Emergency Agricultural Production Programme (EAPP) was taken up during 1972-73 for which Rs 152 crores of long-term loans were approved as Central assistance to the States mainly for the development of minor irrigation. Such emergency measures may be justified due to special circumstances such as uncertainty of weather, crop failures in some parts of the country and such other contingencies. But these are associated at the State level with a set of *ad hoc* measures and hastily drawn up programmes. Such *ad hoc* programmes should normally be avoided. Where emergency assistance becomes unavoidable, it is necessary that the assistance should be accompanied with an assurance of follow-up and complementary measures by the States. The Sixth Finance Commission has laid down the principle that the needs of droughts and floods and such natural calamities for relief work should be found from within the plan frame, if necessary, by advance plan allocations. This approach is commended.

5 IMPLEMENTATION

8.5.1 The primary responsibility for the implementation of agricultural programmes rests with the States. However, as indicated earlier, the efforts of the States in this direction are greatly facilitated by a series of decisions at the national level associated with planning, policy formulation, aid and assistance and supply of requisites of production etc. In which the Centre has got a vital role to play. The Central initiative in these developmental processes and activities cannot be effective except through continuing Centre-State collaboration and partnership. The first condition of a dynamic partnership between the Centre and States is that the administrative machinery for agricultural development at the Central, State and the local levels should be effective. This aspect is dealt with in Chapter 62 on Administration. To

reiterate, the Central agencies and their manner of operation should be a source of sustained strength to the State level organisation. It follows that the Central set-up will have to be functionally complementary to the organisation at the State level and Central operations should not in any way encroach upon the States' responsibility for actual execution of programmes. This calls for a judicious combination of organisation and methods of operation supporting Central initiative along with vigour and self-reliance at the State and the local levels. There can be Central and State level organisations in the same fields but with distinct functions and levels of operation. Different areas and programmes of development are associated with their own peculiar problems and present different typologies of relationships.

Organisation of Supplies and Services

8.5.2 Administrative and institutional arrangements for facilitating various supplies and services constitute an important area in which firm understanding and collaboration between the Central and the State Governments are essential in order to make sure that the administrative assumptions of the State Plans in regard to adequacy and timeliness of various supplies are not belied and a planned use is made of the available resources. It is suggested, therefore, that there should be a definite assurance about the flow of supplies through forward planning so that crop production can be planned effectively. The Inputs Division in the Union Ministry of Agriculture and Irrigation should be able to prepare a complete inventory of supply and demand for various inputs, sufficiently in advance, which should be mutually consistent with regard to the available finances and organisational arrangements. To illustrate the need for forward planning of supplies, for ensuring timely supplies of fertilisers to the farmer, a plan of storage at various points ranging from primary cooperative level to the intermediate and the port or factory level will have to be worked out by the Centre. States will, however, share responsibility for maintaining buffer-stocks of certain amounts and take active interest in building demands and disposing of stocks. The Inputs Division at the Centre will also have to plan out the various other ancillary requirements of balanced fertiliser utilisation such as adequate number of sales and distribution points, credit facilities and promotional measures so that the responsibility for these could be precisely fixed at different levels.

8.5.3 In order that there is synchronisation in the availability of different supplies and related services, the inputs organisation at the Central as well as the State level has to be well-knit. The different wings of the inputs organisation dealing with individual supplies will have to function in a unified manner. This can be facilitated through a coordinating cell within the

inputs organisation which will be responsible for securing coherence in the working of various departmental units and other agencies concerned with the organisation of supplies and services. The arrangement will also be useful from the point of view of having better communication between the Centre and the States in the management of various supplies. At present, the different units/agencies responsible for supplies are working without any framework of planned action.

8.5.4 An important development in the field of various supplies and services is expansion in the scope for Centre-State collaboration in the production and management of critical inputs. The National Seeds Corporation (NSC) and the State Farms Corporation which have been playing an important role in the production and supply of foundation seeds of the varieties of all-India importance represent a typical example. While the production of certified seeds and foundation seeds of local varieties and seed certification have to be the responsibility of the State Governments, the State Government farms, agricultural universities and other institutions have to be involved in the production of foundation seeds and varieties of all-India importance also¹. Responsibility for maintenance of buffer-stocks will have to be distributed between the Centre, the State Governments and the private agencies. Absence of suitable organisation at the State level has been an important handicap in the assumption of full responsibilities by the State Governments in the development of seed industry. Growth of State level seeds corporations is an essential step to fill this gap. The Terai Development Corporation, Uttar Pradesh, presents a useful organisational model for the State level corporations. In the Terai Development Corporation the Agricultural University is fully represented on its management and the Chairman and the Managing Director of the Corporation belong to the University. Therefore, the State level corporations can be set up with joint participation of the NSC, the State Department of Agriculture and the agricultural university in their share capital as well as management.

8.5.5 In another field i.e., agricultural implements and machinery, State level agro-industries corporations have also been set up with Central participation in share-capital. These corporations are responsible for distribution and production of certain categories of agricultural implements and machinery, technical assistance to farmers, operation of hire-purchase schemes, land-reclamation operations, training, promotion of agro-based industries etc. The Central Department of Agriculture can at present nominate three officers to represent it on the boards of directors of agro-industries corporations in the States. However, participation by the Central representatives has not been effective with the result that the

¹ Interim Report on Multiplication and Distribution of a Quality Seed pertaining to High Yielding Varieties and Hybrids of Cereals: 22-23. New Delhi, National Commission on Agriculture.

required technical guidance from the Centre for achieving uniform standards of performance has not been ensured. This has to be improved.

8.5.6 The experience of Central initiative and Centre-State collaboration in the field of related agricultural services like credit and warehousing and storage is more significant. Multiplicity of agencies through which institutional finance is made available is responsible for lack of coordination at both the Central and the State levels. At the national level, various agencies such as the Reserve Bank of India (Agricultural Credit Department), ARC, Agricultural Finance Corporation, the NCDC and the Departments of Agriculture, Rural Development and Banking are working without a common operational plan for supply of agricultural credit and its utilisation. It is necessary that planning and direction in respect of organisation and availability of institutional finance should be provided by the Centre. Responsibilities and the areas of operation including the programmes and the sectors to be covered by the various institutional agencies should be clearly fixed. The role of the national institutions vis-a-vis that of the State level institutions needs to be clearly defined and reviewed continuously to ensure that the basic objectives of these institutions are not ignored.

8.5.7 To illustrate, the original objective of the NCDC was to function as a financing institution for supporting the cooperative industries. Subsequently, it was found that the Reserve Bank of India could not give support to the industrial cooperatives. Thus the value of institutional finance in the cooperative system was not properly understood and the original purpose of constituting the NCDC was lost. It became merely an agency for routing plan assistance to the States which were responsible for the actual utilisation of the assistance. The Public Accounts Committee observed in 1970 that they "have reasons to doubt whether the existence of an official organisation like the National Cooperative Development Corporation in the cooperative sphere, besides the Department of Cooperation is at all necessary".¹ The Expert Committee on NCDC while supporting continued existence of the Corporation observed that it had not been able to fulfil its role in cooperative development fully because of lack of autonomy, funds and staff. The NCDC was not to be conceived as a parallel line of cooperative administration. As observed by the Expert Committee, "The NCDC is to be a Central agency whose role is that of a promoter, innovator, coordinator and, to the extent necessary financier. It has to function in conjunction with, and through, the State Governments so that the cooperative projects it promotes in defined sectors form an integral part of the overall development of the cooperative programmes for the implementation of which the respective State Governments are

¹ Public Accounts Committee (1969-70) Fourth Lok Sabha, Hundred and Sixth Report, National Cooperative Development Corporation 14 & 102. New Delhi, Lok Sabha Secretariat, Government of India, 1970.

responsible. The basic objective of the NCDC should be to help the State Governments stimulate the process of cooperative development in the States".¹ The Expert Committee also favoured strong representation to the States on a General Council to be constituted for the Corporation as its supreme authority. Since the NCDC is to serve the States, it is but logical that their representatives should find a place on its managing body. The aforesaid objectives were embodied in the NCDC (Amendment) Act of 1974. The case of the NCDC has been mentioned specifically because some of the basic principles governing its relationship with the States are equally applicable to other promotional corporations.

8.5.8 To take another case, as originally conceived, the Central and State warehousing corporations were to function as instruments of market ing finance with certificates of storage from the warehousing units as the security for advancing credit to the farmers. This objective has not been fulfilled and in actual practice, the storage facilities are being utilised primarily by the government and semi-government agencies and intermediaries. There is considerable duplication in the operation of various agencies responsible for constructing storage facilities at the Central as well as the State level. At the Central level, apart from the Central Warehousing Corporation (CWC), the Food Corporation of India (FCI), the NCDC, some other development corporations and the Departments of Rural Development and Agriculture are concerned with construction of storage in one or the other aspect. Similarly, at the State level also there is lack of coordination in the construction of storage facilities between the State warehousing corporations, some other development corporations, the apex marketing federations, the cooperative institutions and the State Government. The agro-industries corporations are also building their own godowns. Coordinating bodies like the Central Storage Committee or the coordinating committee at the State level have not been effective. The understanding underlying the warehousing scheme was that warehouses at centres of all-India importance were to be set up by the CWC, those of State or district importance by the State warehousing corporations and at the village or community level by the cooperatives. The coordination committees at the Central and the State levels responsible for drawing up and supervising the implementation of a unified storage development pro-gramme, should be made effective. This is possible if it is clearly stipulated that programmes of construction of additional storage capacity by any agency whether at the Central or the State level can be undertaken only with the prior approval of the respective coordination committees. These bodies could also be empowered to enforce discipline in this activity in the case of defaulters. Finally, under the Central Warehousing Corporations

¹ Report of the Expert Committee on the National Cooperative Development Corporation: para 4.17. New Delhi, Department of Cooperation, Government of India, 1971.

Act, 1962, State Governments can set up warehousing corporations with the approval of the Central Government. The CWC, however, has been working in relation to the State corporations as a kind of holding company and exercises certain controls over the activities of the State warehousing corporations.* States need to have greater say in the management of the corporations. Representatives of the State Government and other connected interests at the State level can be given representation on the Board of Directors of the CWC, as in the case of the NCDC. This will facilitate better coordination between the warehousing or storage construction agencies at the Central and the State levels.

8.5.9 Mutual understanding and adjustment can alone be the basis of a national research system consisting of Central research institutes, research institutes at the State level, the agricultural universities and joint ventures between the Centre and the States. The all-India coordinated research projects were conceived as a kind of joint sector in which the resources of the Central and the State Governments and agricultural universities, were to be pooled. There have been complaints, however, that these projects instead of emerging as a joint sector and guaranteeing inter-institutional coordination, have resulted in centralisation of operations. In actual practice, there is too much concentration of these projects at the Central research institutes and the administration of the projects is also centralised. This has to be avoided and as recommended by the Commission in its Interim Report on Organisational Aspects of All-India Coordinated Research Projects, an important objective of these projects is to provide additional funds and not to replace the research efforts already in hand. Therefore, allocation for research and education in the State sector of the plan should be adequate and should not be allowed to be reduced on account of enhanced provisions in the Central sector.¹ There is need for intimate relationship between the Agricultural Universities, the Central research institutes and the State Agricultural Departments in a particular State. In some States, the agricultural universities are still working in isolation. The objective should be to utilise the facilities and expertise available in the various research institutions whether in the Central or the State sector, for promoting collaboration in research projects and participation in teaching and training programmes. This will help in making use of resources available in the country and in the States to the best advantage and joint programmes can be drawn up to find solution to the problems faced by a State. Duplication and waste of resources will also be avoided and expansion of facilities whether in the Central or the State sectors can be undertaken in a planned manner.

* The paid-up capital of the State Corporations is contributed equally by the Central Corporation and the State Government.

¹ Interim Report on Organisational aspects of All-India Coordinated Research Projects: 13-14. National Commission on Agriculture.

Scope for Technical Guidance and Exchange

8.5.10 We have so far dealt with some key sectors in which Centre-State collaboration has been very close and Centre has assumed the role of direct participation in development and research efforts along with the States. But even in the wider area of development wherein there may not be any significant Central participation, Centre must be a source of effective guidance in various technical, economic and administrative matters affecting the total agricultural sector and not only the Central and centrally-sponsored sectors. For this, the technical divisions in the Ministry of Agriculture and Irrigation should be organised in such a way that they possess the right kind of expertise for providing overall guidance. A prerequisite of technical competence at the Central level is that the technical functionaries under the Department of Agriculture and expertise under the ICAR should not work in isolation from each other. The States should be encouraged to utilise experts in the Ministry of Agriculture and Irrigation and the organisations under its control. There could also be arrangements between two States for meeting specific needs and Centre can facilitate such mutual collaboration by providing information regarding the availability of specialists and technical facilities in other States and institutes. Arrangements could also be introduced under which Specialists in research institutes under the ICAR are utilised by the States to deal with problems faced by them through *ad hoc* deputations from time to time. In a number of cases, the nature of the job may be such that the continued presence of an expert at State level might become necessary in the interest of proper technical advice and assistance. Hence the justification for short-term deputation from the ICAR and the research institutes under it, to the States.

8.5.11 Constitution of an all-India Agricultural Service has been recommended in Chapter 62 on Administration. We feel that all-India Agricultural Service can be the appropriate channel of exchange of expertise and experience between the Centre and the States. It can become an effective means of technical exchange and understanding between the Centre and the States on a continuous basis through formal as well as informal channels. Since with the formation of an all-India Agricultural Service technical posts at the Central level will be tenure posts, it would be possible to draft in officers from the field to the Centre who will be going back to the States at the end of their tenure. Consequently, while the Central agricultural organisation will be exposed to the experiences at the field level, the State agricultural organisation will have the advantage in turn of having officers with broader perspective having experience in national planning and management. Therefore, the all-India Agricultural Service will promote professional understanding and unity of

purpose. It can become the basis for developing conventions and administrative practices conducive to closer partnership between the Centre and the States.

8.5.12 The relationship between the Central units of operation whether in the field of development or research, including their sub-offices located in different regions and the counterpart organisations at the State level, is of equal significance in the system of exchange of technical knowledge and experience. There has been considerable expansion in the Central units and their field organisations working at the State and the local levels. Location of a Central research or training centre or a development project within a particular State offers opportunities for improvement in the standard of performance of the State level institutions. A close working relationship between the Central units and the development and extension organisations at the State level could also ensure complementary action by the State Government concerned with regard to the utilisation of facilities created in the Central institutions. Feedback from the local level could also be facilitated through a linkage with Agricultural Coordination Council at the district level or Agricultural Coordination Committee at the block level as recommended in the Chapter 62 on Administration.

Significance of Autonomous Organisational Framework

8.5.13 Reference was made earlier to the role of a number of autonomous corporations at the national level in the field of inputs, credit and warehousing and storage such as the NSC, the State Farms Corporation, the NCDC and the ARC. These Corporations though Centrally managed have a directly supportive role in relation to State programmes. Central participation in the development corporations and autonomous bodies at the State level, primarily in the form of share capital contribution and financial assistance or association with management, can be useful not only when the Central unit is having a counterpart organisation at the State level, but also in those cases where the autonomous bodies have been set up as purely State level organisations. For example in the case of the Central and State warehousing corporations and the State agro-industries corporations, there is an element of joint participation between the Central and the State Governments. Similar autonomous forms of organisation have been adopted in other fields also. To cite a few cases, there is the Indian Dairy Development Corporation with State level dairy development corporations in a few States, Central Fisheries Marketing Corporation with the State fisheries corporations, State Cashew Corporation, and the Banana Development Corporation with participation of selected States. Rural Electrification Corporation provides loans to the rural electric cooperatives and State Electricity Board. Besides, there are

corporations set up by the States on their own such as the Tubewells Corporation. Mention may also be made of the statutory Boards for tea, coffee, rubber and cardamom under the Ministry of Commerce which are fully responsible for research, extension, supplies and marketing.

8.5.14 The growth of authonomous organisations offers the appropriate institutional framework for combining Central support and initiative with State enterprise and action. Central assistance and participation in the development corporations and autonomous bodies have a number of advantages. Firstly, it makes it possible to earmark resources for the programme covered by a particular autonomous body or organisation, obviating the procedural hurdles which become unavoidable when funds for the Central or Centrally-sponsored schemes are routed through the State Governments. The autonomous organisations have greater operational freedom. In course of time, these bodies come to possess the right kind of expertise tuned to their specific needs. The corporate bodies are also suited for drawing upon institutional finance and associating various connected official and non-official interests with the overall supervision and management of the programmes.

8.5.15 Collaborative efforts between the Central and the States can be promoted better through autonomous bodies with much less scope for dispute regarding mutual powers. The Central stake in the implementation of the programmes covered by these agencies drawing Central financial support is much greater. The association of Central representatives with the management of such State level autonomous bodies can enable the Centre to make a correct appraisal of the problems at the local level. This will help in developing better appreciation and understanding of common problems and the Centre will be in a position to make a more objective assessment of the bottlenecks faced in implementation. Moreover, the autonomous bodies will be instrumental in depoliticising of the decision-making process.

8.5.16 While the growth of development corporations should be welcome, it is necessary that the organisational innovation in this field at the Centre is accompanied with similar initiative and arrangements at the State level. Development corporations at the national level should act as the national grid of development giving full freedom to the State units if any, and proper representation to the State interests in the management of the national body. Except in the case of NCDC, there is no formal association of the representatives of the State Governments with the management of the development corporations at the national level. Besides, in some cases, the relationship between the Central and State level bodies in the same field has not been clearly defined. The development corporation at the two levels should function in a complementary manner so that there is no duplication in their operation. Duplication and overlapping of

activities can take place between corporations working in different fields also. A number of national and State level corporations accepted overlapping activities in regard to grant of loans for inputs, loans for purchase of equipment and machinery, land reclamation etc. The tendency on the part of an individual unit to proliferate its activities, oblivious of its impact on other organisations in the same or allied fields has to be checked through general directions and control of the Government.

8.5.17 Another important aspect to be considered is if there has been adequate cooperation between the autonomous corporations and development agencies and the general development and extension agencies under the State Governments. This is particularly true of the special development agencies like the SFDA or MFAL where the task of actual implementation is to be distributed amongst the extension, supply and credit agencies already working in the districts. We have recommended in our Interim Report on Reorientation of Programmes of Small Farmers' and Marginal Farmers' and Agricultural Labourers' Development Agencies that the States should assume responsibility to prepare plans for irrigation schemes which would benefit the small and marginal farmers and that additional extension staff in the project areas should also be provided by the States. Close linkage between autonomous agencies in the Central or the State sector and the general extension and development agencies under the State Governments could be secured by fixing specific responsibilities on the State Governments in the above manner.

8.5.18 The arguments in favour of autonomous development corporations or authorities cannot be taken as a brief for constituting central corporations in every field or associating Centre with the management of every development activity. Autonomous bodies have been organised in different legal forms such as a statutory body, a registered society or an organisation created by executive order. What is important for cooperative partnership between the Centre and the States is not so much the formal structure as the flexibility of operation and development of appropriate administrative practices and conventions.

Association of Centre with the Management of Key Programmes

8.5.19 There may be a few key sectors needing large investments and coordinated action between the Centre and the States where organisational forms such as the development corporations or agencies have not been adopted so far. Provision in the case of a few such programmes has been made in the Central sector such as the Command Area Development. Similarly, there may be key programmes in the State sector such as the major irrigation projects. Representation of the Centre on the managing committees of such projects will facilitate coordinated action between the

Centre and the States. The Irrigation Commission recommended that "Where a major project receives special financial assistance from the Union Government, the Centre should be represented on the Control Board."¹ The association of Central representative with the management of such key programmes should be only with an aim to evolve a commonly agreed programme on points of mutual interest which should be acted upon by the concerned authorities at the Central and the State level without procedural formalities.

Scope for National Skeletal Legislation

8.5.20 The organisational devices discussed so far may not be applicable to a vast area totally within the State purview. Land reform measures and various land management legislations and regulatory measures by the States have in several cases been found wanting to tackle the basic problems. Lags and inter-State variations in the implementation of land reform measures are well-known. Land management legislation refers to areas wherein collective action at the level of the community is necessary for the protection of the land and its produce and their improvement, i.e. adoption of obligatory plant-protection and soil conservation measures including afforestation of catchment areas, construction and maintenance of field channels and field drains and maintenance of minor irrigation works. Some of the legislation of the State Governments in these areas does not fulfil the standard requirements and suffers from lengthy and cumbersome legal procedures and ineffective enforcement. Similar problems have been faced in case of legislation regarding consolidation of holdings and imposition and realisation of betterment levies. In the field of marketing, the progress of the establishment of regulated markets has not been satisfactory except in a few States, though regulatory acts have been passed by most of the States.

8.5.21 In addition to the above mentioned cases, there is a vast area of other agrarian legislation in which there is lack of uniformity of concepts and procedures and absence of standardisation in respect of various legal provisions as well as the machinery for enforcement. Most of the land management legislation with emphasis on regulation and control is "fairly old" and out of tune with the requirements of the present day. As agriculture is a State subject, the legislation has to be passed by the State legislatures. The Centre influences the legislation through Model Acts and through other advisory roles. But except in a few cases such as groundwater legislation, the Model Acts have not been of much avail. It is true that legislative action in itself cannot provide the answer to various

¹ Report of the Irrigation Commission, 1972, Vol. I:296. New Delhi, Ministry of Irrigation and Power, Government of India.

operational hurdles and uniformity may not always be possible or even desirable. But the common problems of lack of standardisation, slow legislation, legal loopholes, cumbersome procedures and weak enforcement can be avoided to a great extent through an agreed legislative framework or national skeletal legislations setting definite norms at the national level, in a number of important areas. For instance, in Chapter 45 on Forest Protection and Law, recommendation has been made for an all-India Forest Act incorporating uniform procedure, powers and penalties and provisions for subsidiary rule making powers for the States. The legislative framework would also provide for appropriate enforcement machinery at different levels in suitable cases. As mentioned earlier, under Article 252, the Union Government can legislate on any State subject with the consent of the State Governments.

8.5.22 There is also scope for preparing a comprehensive code or a manual dealing with all aspects of agricultural legislation in the States. If this code is prepared by the Centre, the States can adapt it with suitable modifications to suit their local requirements. It is, therefore, necessary to have a well organised division in the Central Department of Agriculture for making continuous study of agrarian legislation and the various regulatory acts etc. and preparing a code with a view to bringing better Centre-State and inter-State coordination in enactment as well as enforcement. There should be a small cell in the Department of Agriculture at the State level also for dealing with these aspects which are completely neglected at present.

Liaison with States

8.5.23 In a very large area, the Central and State commitments to the priorities of programmes and the desired schedule of action will depend upon consensus and mutual understanding. The ability of the Centre to influence or guide the pattern of action on part of the States could be considerably improved if the channels of liaison and communication and interaction between the Centre and the States are strengthened. A number of formal arrangements have been adopted in this connection. The commodity development councils and directorates of development constituted on a regional basis for commercial crops and a few non-cash crops like pulses have been assigned an important role in securing liaison with the States in the implementation of the concerned programmes as well as in laying down policies for production and marketing. However, as recommended by us in our Interim Report on Commodity Development Councils and Directorates, the concept of commodity development councils should be confined to the crops which have a substantial industrial and/or export value. As stated in the Report, "the Centre cannot without taking over the entire State administration in the rural sector, do agricultural

production better than the States. Proliferation of Central directorates, therefore, to strictly supervise the field programmes is a luxury, the country cannot afford". Accordingly, it was recommended that there should not be any development council or directorate for wheat or rice. The directorates of development for commercial crops also should not be involved in implementation of programme in this field. There could be commodity council or councils at the State level dealing with the crops covered by the Central development councils in the interest of better co-ordination and for adapting Central recommendations to local conditions. There should be organic link between the Central and State level councils. One of the basic objectives of these councils is to give vent to the demands of growers' representatives at the Central and State levels and bring the farmers into the system. The State level council will accordingly suggest the methods through which the improved technology can be extended within a particular region or State.

8.5.24 Apart from development councils and directorates which have been assigned a specific role in chosen sectors, several alternatives have been tried in the past for maintaining liaison between the Centre and the States. Senior officers in the Department of Agriculture at the Centre of the rank of Joint Secretary and above have been allotted some States which they are expected to visit periodically and assist in maintaining liaison between the Centre and those States. Another method of appointing State Liaison Officers and locating them in the regions was also tried and discontinued. Joint Central Teams of officers of the Ministry of Agriculture and Planning Commission have been visiting the States to review the implementation of agricultural development programmes. The underlying premise of this arrangement is that the presence of senior officials from the Centre in the discussions at the State level would enable quick decision on detailed issues. In the initial years, these served a useful purpose when the teams were led by Secretaries and Additional Secretaries. There is an impression that recently the visits by the Central teams have become a mere routine. Lack of detailed knowledge about the State programmes and priorities is a serious limitation upon this exercise. The effectiveness of the Central teams could be considerably improved, if these are posted in advance with the details of bottlenecks in implementation faced by a particular State so that the discussions with the States are to the point. This is possible if these teams work under close supervision of the planning division in the Department of Agriculture at the Centre as proposed in Chapter 62 on Administration.

Memorandum of Understanding

8.5.25 Reference was made earlier to the need for detailed agreement on the working programme between the Centre and the States in respect of

certain key development programmes. The concept of detailed agreement may have a wide application and could take the form of written Memorandum of Understanding in suitable cases. Under it the responsibilities of the Central and the State Governments or agencies under them, in the formulation and implementation of a particular programme, could be defined. The strength of such an agreement lies in the precision and clarity with which accord is reached with regard to the respective roles of the Central and State level agencies in implementation including timing and phasing of the programme, the calendar of operations and the procedure for review. Such an agreement will remove uncertainties regarding utilisation of facilities available at the Central and the State levels for the programmes covered by the agreement. It would also avoid delay that takes place in securing piecemeal agreement on even minor matters in course of execution of programmes. It would be possible to ensure support from the various connected agencies at different levels in keeping with the time-schedule of the implementation of the programme. The Memorandum of Understanding could cover a particular programme or may be confined to a specific aspect of the programme depending upon the need and possibilities of agreement. Even the non-governmental and autonomous agencies at the Central and the State levels could enter into such an agreement for common purposes. In the field of research, this could take the form of a tripartite agreement between the ICAR, the State Government and the agricultural university.

8.5.26 Joint commitment covering the total plan of agricultural development, however, can hardly be secured only through a memorandum. What is required is a systematic effort to streamline the administrative organisation from the field to the Central level. In the Fifth Plan, sizable amounts have been earmarked in the Central sector for strengthening the administrative machinery for agricultural development. However, piecemeal efforts in this field, without having full knowledge about the nature of problems faced by a particular State in individual sectors, will not be effective. The organisation at the Centre dealing with agricultural extension and administration should, therefore, be in possession of full information regarding these problems and should be in close touch with the States for this purpose. At present there is lack of detailed knowledge of administrative problems faced by the individual States or sectors. The organisation for extension and agricultural administration at both the Central and the State levels will have to be suitably streamlined to remove this gap. This aspect has been dealt with in Chapter 62 on Administration.

8.5.27 In conclusion, it may be reiterated that while the responsibility for actual execution of agricultural development programmes must be that of the States, effective execution is dependent upon a chain of

developmental activities in the organisation of which the Centre has a vital role to play. The Constitution offers adequate scope for Central initiative and Centre-State collaboration in this area. Autonomous development corporations or bodies and similar other agencies should be welcome as the appropriate organisational framework for combining Central initiative with State enterprise and action. The Central institutions should, therefore, work towards establishment of national grid of development in various fields. This is already reflected in the concepts of river grid or irrigation grid, milk grid, national research system or the all India coordinated research projects. While it is true that Centre should influence through its knowledge and competence and not direct through its controlling powers, the functions of influence and guidance cannot be fulfilled except through deliberately built channels of communication, mutual commitment and cooperative efforts. It is necessary that the relationship between the Centre and the States in agricultural development is subjected to periodical review and the organisations and institutions at the two levels and their method of operation are adjusted to the new responsibilities thrown up by the developmental process. Centre and the States are to be regarded as parts of a single system in which the right relationship between the two is to be guided by the criteria of efficiency and economic necessity and ensured through understanding and adjustments. "The greater the get-together, and the greater the willingness to adjust, as problems arise, the greater the welfare of the country!"

6 SUMMARY OF RECOMMENDATIONS

8.6.1 The main recommendations are as under :

1. The norms for Centre-State relations in agricultural development have to be developed in a long-term perspective laying down only the broad framework and the basic principles in this regard.

(Paragraphs 8.1.1 to 8.1.10)

2. The problems of Centre-State relations in agricultural development are basically not on account of any gaps in the constitutional framework and have to be tackled mainly through consensus, agreement and better organisation and management.

(Paragraphs 8.2.1 to 8.2.10)

3. The planning, coordination and valuation cells from the block and district to the national level should be the channel for discussions leading to the development of consensus for adjustment of the plan and policy frame from time to time.

(Paragraph 8.3.2)

¹ Sivaraman B., Agriculture—State Union Relations: Indian Journal of Public Administration, 1970 Vol. XVI. No. 3:351.

4. There should be a continuous dialogue between the Central and the State working groups so that the adjustments in the plan frame on account of possible financial constraints are within the general acceptance of the States and their appreciation of priorities of programmes and implementing capacity.

(Paragraph 8.3.5)

5. States also should be closely associated with the formulation of the Central and Centrally-sponsored sector of the agricultural plan which can be done through joint Working Groups consisting of the Central and the State representatives.

(Paragraphs 8.3.6 & 8.3.7)

6. There has to be a close integration between plan and the budget at both the State and the Central levels through the planning units at these levels.

(Paragraph 8.3.8)

7. Centre has a genuine role in laying down the broad framework of developmental policies and providing guidelines on some of the basic issues connected with the administration of programmes. Alternative approaches to a problem with their implications should be fully spelt out so that the States are able to take their own decisions adapting the general guidelines to local conditions.

(Paragraph 8.3.10)

8. The decision-making process should be improved through suitable organisational and other measures. Results of evaluation should be fed into the policy-making process. The process of feedback can be facilitated through close contacts between research and development organisations under the control of the Central and the State Governments. Other important measures are constitution of Agricultural Development Council at the State and Consultative Council at the Central level, activisation of the advisory bodies and panels, decentralisation of decision-making and training in agricultural administration and management and economic decision making.

(Paragraphs 8.3.12 & 8.3.13)

9. Reaction of the State Governments to the national policies in non-agricultural sectors should also be sought for taking decisions. The consultative council under the Central agricultural set-up could be the appropriate forum for this purpose.

(Paragraph 8.3.14)

10. A long-term perspective has to be developed in respect of Central and Centrally sponsored schemes being implemented through the State agency and a strategy has to be followed under which these schemes ultimately form part of the State sector. The number of such Central or centrally sponsored schemes should be kept to the minimum.

(Paragraph 8.4.4)

11. Earmarking of resources for key sectors of development can be secured even while such programmes form part of the State sector. States can issue sanction for these schemes after their details have been worked out in consultation with the Centre and the Central assistance can be released on the basis of expenditure reported by the States, on the earmarked basis.

(Paragraph 8.4.5)

12. The system of *ad hoc* Central assistance for emergency production programmes and such other purposes should normally be avoided. Where emergency assistance becomes unavoidable, it is necessary that the assistance should be accompanied with an assurance of follow-up and complementary measures by the States.

(Paragraph 8.4.6)

13. There should be a definite assurance about the flow of supplies through forward planning so that crop production can be planned effectively. At the Central as well as the State level, there should be a coordinating cell in the Inputs Division under the agricultural set-up for securing coordination in the organisation of individual supplies and services.

(Paragraphs 8.5.2 & 8.5.3)

14. Growth of State level seeds corporations will be necessary in order that the States assume full responsibilities in the development of seed industry. The State level corporations can be set up with joint participation of the agricultural universities, State Department of Agriculture and the National Seeds Corporation.

(Paragraph 8.5.4)

15. The basic objective of the National Cooperative Development Corporation (NCDC) should be to help the State Governments in the process of cooperative development in the States. The model of NCDC can be followed by other promotional corporations at the national level for allowing State participation in their management.

(Paragraph 8.5.7)

16. The coordination committees at the Central and the State levels responsible for drawing up and supervising the implementation of a unified storage development programme should be made effective.

(Paragraph 8.5.8)

17. Centre must be a source of effective guidance in various technical, economic and administrative matters affecting the total agricultural sector and not only the Central and centrally sponsored sectors. States should be encouraged to utilise the experts under the Central agricultural departments and the ICAR.

(Paragraph 8.5.10)

18. The All-India Agriculture Service can be utilised as a channel for exchange of experience and expertise between the Centre and the States. The technical posts at the Centre including those at intermediate levels should be tenure posts.

(Paragraph 8.5.11)

19. A close working relationship should be established between the field units under the Central agricultural set-up and the counterpart organisations at the State level, so that complementary action in the State sector in regard to the utilisation of facilities created in the Central sector is ensured.

(Paragraph 8.5.12)

20. Development corporations at the national level should act as a national grid of development giving full freedom to the State units where in existence, and proper representation to the State interests in the management of the national body. The autonomous corporations and agencies should not work in isolation from the general development and extension set-up under the State Governments. These bodies can be instrumental in depoliticising decision-making and securing a better accord between the Centre and the States.

(Paragraphs 8.5.13 to 8.5.17)

21. In the case of key sectors needing large investments such as Command Area Development, a Central representative could be associated with the management of the development authority at the State level with the object of evolving a commonly agreed programme on points of mutual interests.

(Paragraph 8.5.19)

22. The shortcomings in land management legislation, other agrarian legislation and regulatory acts and their administration can be avoided to a great extent through an agreed legislative framework or national skeletal legislation setting definite norms at the national level in a number of important areas. A comprehensive code or manual dealing with agrarian legislation in the States should be prepared by the Centre which could be adopted by the States with suitable modifications to suit their local requirements. There should be a well-organised Division in the Central Department of Agriculture and a small cell in the Department of Agriculture at the State level for making continuous study of agrarian legislation and preparing a code.

(Paragraphs 8.5.20-8.5.22)

23. Central teams could be more effective if these are posted in advance with the details of bottlenecks faced by a particular State so that the discussions with the States are more specific.

(Paragraph 8.5.24)

24. There could be written Memoranda of Understanding on the

working programmes between the Centre and the States in suitable cases specifying respective roles and responsibilities of the Central and the State Governments or agencies under them, in the formulation and implementation of the concerned programmes.

(Paragraph 8.5.25)

25. Streamlining of the administrative machinery from the field to the Central level is necessary in order to build joint commitment between the Centre and the States covering the total plan of agricultural development.

(Paragraph 8.5.26)

APPENDIX 8.1

(Paragraph 8.2.1)

Distribution of Legislative Powers

Seventh Schedule

(Article 246)

List I—Union List

28. Port quarantine, including hospitals connected therewith; seamen's and marine hospitals.
42. Inter-State trade and commerce.
43. Incorporation, regulation and winding up of trading corporations, including banking, insurance and financial corporations but not including cooperative societies.
44. Incorporation, regulation and winding up of corporations, whether trading or not, with objects not confined to one State, but not including universities.
45. Banking.
47. Insurance.
51. Establishment of standards of quality for goods to be exported out of India or transported from one State to another.
52. Industries, the control of which by the Union is declared by Parliament by law to be expedient in the public interest.
56. Regulation and development of inter-State rivers and river valleys to the extent to which such regulation and development under the control of the Union is declared by Parliament by law to be expedient in the public interest.
57. Fishing and fisheries beyond territorial waters.
59. Cultivation, manufacture and sale for export of opium.
63. The institutions known at the commencement of this Constitution as the Banaras Hindu University, the Aligarh Muslim University and the Delhi University, and any other institution declared by Parliament by law to be an institution of national importance.
64. Institutions for scientific or technical education financed by the Government of India wholly or in part and declared by Parliament by law to be institutions of national importance.
65. Union agencies and institutions for—
 - (a) professional, vocational or technical training, including the training of police officers; or
 - (b) the promotion of special studies or research; or
 - (c) scientific or technical assistance in the investigation or detection of crime.
66. Coordination and determination of standards in institutions higher education or research and scientific and technical institutions.

69. Census.
81. Inter-State migration ; inter-State quarantine.
82. Taxes on income other than agricultural income.
97. Any other matter not enumerated in List II or List III including any tax not mentioned in either of those lists.

List II—State List

11. Education including universities, subject to the provisions of entries 63, 64, 65 and 66 of List I and entry 25 of List III.
14. Agriculture, including agricultural education and research, protection against pests and prevention of plant diseases.
15. Preservation, protection and improvement of stock and prevention of animal diseases; veterinary training and practice.
16. Pounds and the prevention of cattle trespass.
17. Water, that is to say, water supplies, irrigation and canals, drainage and embankments, water storage and water power subject to the provisions of entry 56 of List I.
18. Land, that is to say, rights in or over land, land tenures including the relation of landlord and tenant, and the collection of rents; transfer and alienation of agricultural land; land improvement and agricultural loans; colonization.
19. Forests.
20. Protection of wild animals and birds.
21. Fisheries.
26. Trade and commerce within the State subject to the provisions of entry 33 of List III.
27. Production, supply and distribution of goods subject to the provisions of entry 33 of List III.
28. Markets and fairs.
30. Money-lending and money-lenders; relief of agricultural indebtedness.
32. Incorporation, regulation and winding up of corporations other than those specified in List I, and universities, unincorporated trading, literary, scientific, religious and other societies and associations; co-operative societies.
45. Land revenue, including the assessment and collection of revenue, the maintenance of land records, survey for revenue purposes and records of rights, and alienation of revenues.
46. Taxes on agricultural income.
47. Duties in respect of succession to agricultural land.
48. Estate duty in respect of agricultural land.

List III—Concurrent List

9. Bankruptcy and insolvency.
17. Prevention of cruelty to animals.
18. Adulteration of foodstuffs and other goods.
20. Economic and social planning.

23. Social security and social insurance; employment and unemployment.
25. Vocational and technical training of labour.
29. Prevention of the extension from one State to another of infectious or contagious diseases or pests affecting men, animals or plants.
30. Vital statistics including registration of births and deaths.
33. Trade and commerce in, and the production, supply and distribution of,—
 - (a) the products of any industry where the control of such industry by the Union is declared by Parliament by law to be expedient in the public interest, and imported goods of the same kind as such products;
 - (b) foodstuffs, including edible oilseeds and oils;
 - (c) cattle fodder, including oilcakes and other concentrates;
 - (d) raw cotton, whether ginned or unginned, and cotton seed; and
 - (e) raw jute.
34. Price control.
38. Electricity.
45. Inquiries and statistics for the purposes of any of the matters specified in List II or List III.

NUTRITION

1 INTRODUCTION

9.1.1 Dietary allowances are based on a balanced proportion of the five constituents of food materials, namely, carbohydrates, fats, proteins, minerals and vitamins. The amounts and proportions of each in diets vary with age, sex, body weight, occupation and ambient temperature of the subject. A scrutiny of the dietary habits of normal healthy people in different parts of the country reveals significant differences. This raises the important question whether a uniform dietary allowance is required to be recommended. The dietary habits are largely dominated by local availability of food materials, and hence local foods should find proper place in any recommended dietary allowance. The right choice of local foods has, in addition, an economising effect on the food budget. Special considerations should apply to the cross section of the population constituted of pre-school children, pregnant women, nursing mothers and industrial workers and tribals, because they represent the vulnerable groups.

9.1.2 Unbalanced intakes of protein and calorie (carbohydrates and fats) at early stages of growth give rise to malnutrition, which costs heavily to the nation, because of its harmful and almost irreparable after-effects on health. Calculations regarding the extent of protein-calorie malnutrition suggest that it is more prevalent amongst the vulnerable groups than the rest of the population. However, if the calorie intake is taken care of, e.g., by raising cereals consumption, protein intake would take care of itself.

9.1.3 Food quality is quite often largely dependent on the nature of the processing which food materials have to pass through right from the harvest stage to the table. This applies equally to food served at home or in public eating houses. The latter require more careful control by means of inspection and legislation. There are a number of simple steps which can be taken, with proper education, to conserve quality. The steps include those related to the removal of toxic and antinutritional constituents in food materials, particularly in some pulses, tubers and oilseeds.

9.1.4 While food is scarce and in time to come is likely to get scarcer, even in a global sense, attention of nutritionists and agriculturists have

been drawn to new and semi-conventional food materials, which can be processed into edible and acceptable forms. Some of these foods depend primarily on solar energy for their production and hence deserve added attention in an energy-hungry world and where, e.g., in India, solar energy is more readily available.

9.1.5 Fortification of foods with vitamins and minerals against nutritional disorder may be obligatory for a certain section of the population, but rethinking is demanded in view of experiences in other countries, whether fortification is the real answer to nutritional disorders. Food technology seems to go ahead of nutritional science and a fresh look would be desirable before we launch upon technological innovations which in the long run may not be worthwhile.

9.1.6 Nutrition rehabilitation programmes meant primarily for the benefit of the vulnerable groups have a decided virtue. But it is doubtful whether the programmes launched by Government and private agencies are able to touch more than a fringe of the vast problem. Moreover, in the absence of any follow-up action, the actual benefit cannot be correctly estimated. There is no substitute for educating the people on the principles of nutrition, how food should be selected and processed using local foods as examples. Nutrition education can be intervened at a number of levels, for which not much of additional infrastructure would be required. The Central and State Government extension wings, educational institutions, learned societies, medical and paramedical personnel can inject in one form or the other some elements of nutrition education.

9.1.7 Food and nutrition go hand in hand with health. This is, therefore, a strong justification for a well thoughtout and comprehensive food and nutrition policy which should pave the way to better health of the people and a brighter prosperity of the nation.

9.1.8 This chapter on Nutrition deals with the points outlined above and those allied to them. An attempt has been made to bring out a balanced view of nutrition in the context of scarcity of food materials in India and the crippling poverty and malnutrition of a large section of the population.

2 DIETARY ALLOWANCES

9.2.1 Dietary habits, throughout the work, are largely dominated by local availability of foods. By a process of trial and error, long experience guides people to evolve diets which, ordinarily, keep them in normal health. The scientific approach to dietary allowances is based on principles of nutrition and the composition of foodstuffs in terms of carbohydrates, fats, proteins, minerals and vitamins.

9.2.2 For quite some years the dietary allowances in India were based partly on recommendations of the League of Nations, the National

Research Council of United Kingdom and partly on data collected by Indian workers. The concept of nutrient requirements for the human beings has been changing with newer knowledge of nutrition. The Nutrition Expert Group of the Indian Council of Medical Research (ICMR) revised in 1968 the recommended allowances of nutrients (Appendix 9.1). The unique feature of the revised schedule is that this has taken into consideration Indian conditions and taken advantage of the data on Indian diets collected over the last five decades.

9.2.3 A balance diet contains ingredients in the right quantity, quality and proportion, so that satisfactory growth, development and maintenance of the body are achieved. It is formulated on the basis of knowledge about various nutrients and their functions in the body. The following factors are considered important in formulating a balanced diet : (a) knowledge of the daily nutrient requirements; (b) judicious selection of the right foods in adequate amounts taking into consideration their availability in different seasons and cost; (c) variety of ingredients to suit various tastes; and (d) age, sex, occupation and food habits, both meat-eating* (including fish and egg) and vegetarian. Balanced diets for different age groups are presented in Appendix 9.2 Statements I to IV.

Composition of Diets

9.2.4 The existing patterns of diets in different parts of India have been extensively studied through periodical diet surveys carried out by the ICMR nutrition unit of Health Directorates of State Governments and national sample surveys. These surveys covering urban and rural areas extend to general population groups, preschool children, pregnant mothers tribals and several occupational groups such as agriculturists, farm labourers, weavers, industrial workers, petty traders and white collared workers etc. These surveys have revealed certain general characteristics of Indian diets, namely, (a) the preponderance of cereals; (b) markedly low intakes of protective foods; (c) regional variation in staple foods such as rice, wheat, millets or tubers; (d) large section of the general population, meat-eating by habit, consumes nonmeat foods due to low income. Diet schedules of these surveys are shown separately in Appendix 9.3

9.2.5 The existing patterns of diets are obviously crude averages for the different States. However, these figures do indicate the patterns of consumption of various foods by a large section of the population in the respective States. An examination of these patterns in the light of the recommended allowances reveals certain qualitative and quantitative deficiencies. The salient features are as follows :

- (i) The intake of cereals is largely adequate in most of the States except in Kerala. The intakes of almost all the other groups of

* 'Meat-eating' is preferred to the misnomer 'nonvegetarian'

foods are grossly below the levels recommended. This is particularly so in the case of pulses, vegetables, milk and other animal foods. The intake of fats and oils is also markedly low. It, therefore, becomes obvious that the dependence on cereals for energy purposes is exaggerated on account of the lack of other foods in the diet.

- (ii) The calorie intake of most of the States, except Punjab and Madhya Pradesh, are well below the suggested level of 2,400 calories. The extent of deficit ranges between 10 and 20 per cent. The calorie intake in Tamil Nadu is the lowest, i.e. 1,500 calories. The fat consumption is related to calorie intake (vide Table 9.1)
- (iii) The intake of proteins is adequate in most of the States with marginal deficits in Tamil Nadu, Kerala and West Bengal. The major proportion of protein in most of the States is derived from foods of plant origin. The intake of animal protein in the form of fish is appreciable only in Kerala and West Bengal.
- (iv) There is not much variety in the consumption of cereals, undue preference being given to a single cereal, e.g., wheat in the northern parts, rice in the southern and eastern parts, and millets in the plateau region. This must be viewed in the context of nutritional superiority of mixed cereals in diets.

TABLE 9.1

Average Intake of Nutrients in Different States (1968-69)¹

(per capita per day)

State	Calories	Protein (gm)		Total fat (gm)
		Total	Animal	
Andhra Pradesh	2,040	53	5	21
Bihar	1,865	56	3	13
Gujarat	1,612	54	2	13
Jammu & Kashmir	2,265	63	1	25
Kerala	1,842	47	11	25
Madhya Pradesh	2,779	98	7	45
Maharashtra	2,281	68	6	30
Mysore (Karnataka)	2,220	66	3	18
Punjab	2,832	84	16	52
Rajasthan	2,044	77	5	34
Tamil Nadu	1,498	36	4	12
Uttar Pradesh	2,307	66	5	32
West Bengal	1,927	48	7	24
All India	1,985	55	6	24
Suggested allowance	2,400	44	—	—

¹ Reports of nutrition work done in States (1968-69), National Institute of Nutrition, Indian Council of Medical Research, Hyderabad; Recommended daily allowances of nutrients and balanced diets recommended by the Nutrition Expert Group ICMR (1968); nutrition activities carried out in the States and Union Territories compiled by Nutrition Cell of the Directorate General of Health Services, New Delhi.

NB. Tables 9.1, 9.2, 9.3, 9.4 and 9.5 also appear in Diet Atlas of India (1971), National Institute of Nutrition (ICMR), Hyderabad.

9.2.6 The factors which predominantly govern the existing patterns of consumption are : availability, economic and social considerations, food habits born out of cultural and religious practices and climatic environment. In this connection notice has to be taken of unaccounted for nutrition obtained from beverages, including alcoholic ones, fruits and snacks by the rural as well as the urban population. Then, there are the tubers such as tapioca and vegetables of varied kinds which are not marketed but consumed in the rural sector by the producers themselves. Animal protein intake is generally low (vide Table 9-6) in most of the Asian countries. Animal proteins are considered to be nutritionally superior because of their favourable amino acid profile. However, a vegetarian diet composed of cereals, pulses and milk may easily provide a similar amino acid profile.

Diets of Special Groups

9.2.7 After examining the existing dietary patterns of adults in the general population, it is worthwhile assessing the dietary patterns of some special groups and those of the so-called vulnerable groups of population. The pre-school children, school-age children, pregnant and nursing women belong to the vulnerable groups who need special attention in regard to nutrition.

- (i) Preschool children of the age group 1—5 years form a sizable proportion of the population (around 15 per cent). The existing diets of this group show gross deficiencies in many respects (vide Table 9.2). The intake of protective food is much below the recommended levels. The cereals intake is marginal showing a deficit of about 15—20 per cent. The protein intake is just adequate (19-20 gm), but the deficit is sizable in calories (short by 40 per cent), and important constituents such as iron, calcium and vitamin A. A detailed analysis carried out by the ICMR of the individual diet of preschool children, however, reveals that 35 per cent of children do not get adequate protein. According to a survey¹ of the metropolitan area of Calcutta, diets of one-third of the preschool children are deficient in protein, 98 per cent in calories and 71 per cent in vitamin A.
- (ii) The dietary patterns of school children which account for about 20 per cent of the population in the low income and high income groups have been examined. Table 9.3 gives some typical data for the protein and calorie intakes of school children in Hyderabad. The protein intake of the low income groups appears from

¹ 1972. United States Agency for International Development, New Delhi. A study of food habits in Calcutta metropolitan area, 1969-70. Hindustan Thomson Associates, Calcutta.

the table to be satisfactory in the lower age range (7 to 11 years) but in the higher age range (11 to 14 years) the diet is deficient in both protein and calorie. Calorie deficit is uniformly prevalent in the low income groups in the entire range (7 to 14 years). The nutritional level of the high income groups is satisfactory for all the school children studied.

- (iii) The diets of pregnant and nursing women are found to be not much different from the usual diets of non-pregnant women, which are grossly deficient in protective foods, calorie protein, iron and calcium (vide Table 9.4).
- (iv) Of the special groups, those of the industrial workers and tribal peoples deserve mention. Typical diets of industrial workers such as coal fillers and textile workers have been surveyed. In these diets, protein requirement has been met but deficit of calorie is of the order of 15—20 per cent and protective foods are lacking in all of them (vide Table 9.5 for coal fillers).
- (v) Diets of tribal groups have been surveyed covering about 15 tribal groups in the mainland and Andaman islands. Rice and millets form the staple foods for most of them. The calorie intake of Abors, Nicobarese, Onges, Mompas and Todas is adequate while that of the others is deficient. The protein intake of Warlis, Uralis, Nurumbas, Irulas and Dublas is deficient to the extent of 40—50 per cent while that of the others is adequate. The protein intake of Onges and Nicobarese is very high (110-135 gm) due to high intake of pork and fish (vide Appendices 9.4 and 9.5)

TABLE 9.2
Diet and Nutrient Intake of pre-school Children¹

Particulars (gm)	Intake 1	Recommended allowances (gm. per child per day)	
		Nonmeat 2	Meat 3
food items (gm)			
cereals	147	175	175
Pulses	16	55	45
milk	80	275	200
oils and fats	4	23	25
leafy vegetables	4	63	63
other vegetables	14	40	40
Sugar and jaggery	5	35	35
flesh foods	4	—	30
fruits	7	50	50
snacks	5	—	—

1 ICMR Studies on diets of pre-school children;
 (i) National Institute of Nutrition, Hyderabad;
 (ii) Christian Medical College, Vellore; and
 Recommended daily allowances of nutrients and balanced diets, Nutrition Expert Group, ICMR (1968), Special Report Series No. 60.

1	2	3	4
nutrients			
protein (gm)	19.5	19.5	
calories	758	1,275	
vitamin A (I.U.)	572	1,050	
iron (mg)	8.6	17.5	
calcium (mg)	230	450	

TABLE 9.3
Protein and Calorie Intake of School Children In Hyderabad¹
(per child per day)

Age in years	Calories			Proteins (gm)		
	Low income group	High income groups (public schools)	Suggested requirements (ICMR 1968)	Low income groups	High income groups (public schools)	Suggested requirements (ICMR 1968)
7-9	1,429	2,186	1,800	37.0	67.8	33.0
9-11	1,411	2,343	1,950	36.5	62.1	37.0
11-13	1,292	2,823	2,300	34.5	72.2	41.0
13-14	1,374	2,585	2,300	35.5	75.5	52.0
all age groups	1,576	2,485	2,090	35.9	89.4	41.1

1 (i) National Institute of Nutrition, ICMR, Hyderabad School Children Studies 1963;
(ii) *Ibid.*, Public School Children Studies (1970-71); and ICMR Dietary Allowances for Indians (1968)

TABLE 9.4
Diets of Pregnant and Nursing Women¹

Particulars	Pregnant women		Nursing women	
	Actual intake	Recommended allowance	Actual intake	Recommended allowance
food items (gm)				
cereals	276	400	333	450
pulses	21	55 (70)*	15	65(80)*
leafy vegetables	8	150	9	150
other vegetables	12	75	23	75
roots & tubers	8	75	23	75
fruits	26	30	4	30
milk and milk products	41	225 (325)	23	225(325)
fats & oils	20	35 (40)	12	55 (50)
animal foods	22	60	20	60
sugar & jaggery	14	40	15	50
nutrients				
calories	1,420	2,500	1,425	2,900
proteins (gm)	37	55	39	65
iron (mg)	18	40	18	30
calcium (mg)	200	1,000	200	1,000

1 Leela A Iyengar (1969), Nutrition, 3 (3), 2; Annual Reports (1965-66), Nutrition Research Laboratories.

* Figures in parenthesis relate to recommended allowances for vegetarians.

TABLE 9.5
Diets of Coal-filers of Singareni Collieries

Particulars	Intake per head per day	Recommended	allow-
		Vegetarian	Meat-eating
food items (gm)			
cereals and millets	667	650	650
pulses	59	80	65
flesh foods	57	—	30
egg	2	—	30
milk and milk products	71	200	100
fats and oils	25	50	50
leafy vegetables	12	125	125
other vegetables	22	100	100
roots and tubers	53	100	100
fruits	—	30	30
sugar and jaggery	19	55	55
toddy	76	—	—
nutrients			
protein (gm)	81 (14)*	55	
calories	3,100	3,900	
iron (mg)	30	20	
calcium (mg)	444	450	

1 (i) Nutrition and Working efficiency in coal miners at Kothagudem area in Andhra Pradesh, National Institute of Nutrition, Hyderabad; and
(ii) ICMR Special Report Series No. 60, Dietary allowances for Indians (1968).

* Figure within bracket denotes protein from animal sources.

Protein and Calorie Intakes

9.2.8 Comparative data of the protein and energy consumption in foods of the developed countries with the developing countries given in Table 9.6 show the noticeably low consumption of both in most of the latter.

TABLE 9.6
Protein and Calorie Intakes in Developed and Developing Countries¹

Country	protein (gm)	Energy (calories)
Australia	92 (61)*	3,140
New Zealand	105 (72)	3,490
UK	89 (52)	3,280
USA	92 (65)	3,100
China	59 (8)	2,010
Sri Lanka	45 (9)	2,050
India	52 (6)	1,980
Japan	69 (17)	2,230
Malaysia	52 (9)	2,340
Philippines	47 (13)	1,870

1 Sen Gupta, P. N. (1975), 12th B. C. Guha Memorial Lecture, Indian Science Congress Association, Delhi.

* Values in parenthesis refer to animal proteins in gm.

These averages particularly with reference to a populous country like India, are misleading. Unless data are compiled sectorally according to economic groups, they lose their usefulness in so far as planning and distribution of food and nutrition are concerned. Because of differences in dietary habits of the people from one State to another, the survey data should preferably be available on a State basis.

9.2.9 The weighted values of per capita energy and protein requirements calculated by different expert groups vary. Thus, they are respectively 2,170 calories and 26 gm (NPU 53%)* according to the latest¹ (1971) calculations made by the Food and Agriculture Organisation (FAO)/World Health Organisation. The same agency earlier² (1965) estimated them to be 2,320 calories and 32 gm (NPU 53%). On the other hand, the ICMR-revised estimates made in 1968 are 2,400 calories and 44 gm (local protein) whereas according to Sukhatme's³ calculations the values are 2,200 calories and 30/36 gm (probably reference protein) respectively Sen Gupta⁴ considers that the values given by revised FAO/WHO and Sukhatme are somewhat low and too risky for the country where bulk of the population suffers from acute malnutrition. He has suggested 2,300 and 51.5 gm (NPU 53%) as the calorie and protein requirements respectively. In view of these divergent values, the ICMR should re-estimate the energy and protein requirements and their distribution according to age, sex, body weight and ambient temperature [making usual allowance for the pregnant and lactating mothers and thereby arrive at more reliable per capita values.

9.2.10 If the supply and requirement of energy and protein of average Indian diets are compared for the four years 1968-69 to 1971-72 it is found that while the supply of energy falls short of requirement by about 14-16 per cent, that of protein has shown an increase, being in excess of requirement by 6 to 12 per cent during the last two years. The figures are given below:

	Supply Divided by Requirement	
	Calorie	Protein
1968-69	0.84	0.98
1969-70	0.84	1.00
1970-71	0.86	1.12
1971-72	0.85	1.06

* NPU = Net Protein Utilisation.

1 FAO/WHO (1971). Joint Expert Group on Energy and Protein Requirements. FAO Nutrition Meetings Report Series No. 52.

2 FAO/WHO (1965). Joint Expert Group on Protein Requirements Report. FAO Nutrition Meetings Report Series No. 37.

3 Sukhatme, P. V. (1973). The protein problem. Everyman's science, 8(1), 14.

4 Sen Gupta, P. N. (1974) The Protein and energy needs in India and their average supplies, *Ibid.* 1 (p. 133) : 14.

Average values weighted on the basis of age alone provide little information about the various socio-economic groups, a large proportion of which suffer from dietary inadequacies and nutritional deficiencies simply because of their extremely low buying power. Consequently, even though the averages show marginal differences between supply and requirement, the actual situation is that a large bulk of the population remains underfed.

9.2.11 Calorie requirement is dependent on age, sex, body weight and the ambient temperature. The proportion of energy required to maintain thermal balance with the environment will be the smaller, the higher the ambient temperature. Temperatures vary a great deal from one part of the country to another, so also do average body weights in different regions. Consequently, the States show (vide Table 9.1) considerable variations in both calorie and protein intakes. Within a State, further variations would be noticed amongst different socio-economic groups. The variations are significant and should not be interpreted merely as so much deficient or sufficient in terms of the average nutritional requirement. In fact one cannot summarily conclude that the energy deficient diets are poor and must be enriched. The differences may rightly be a consequence of the differences in ambient temperatures and body weights. From the low calorie and protein intakes it may appear that an average adult from Tamil Nadu is half as nourished as one from Punjab. But according to ordinary health standards, one does not find it to be so. While recommending dietary allowances the various factors determining them should, therefore, be more rationally looked into. It may not be unlikely that local foods contain a more favourable mix of major and minor ingredients than could be accounted for by simple calculations of calorie and protein intakes.

9.2.12 A recent nutritional survey of the Canadian population¹ has indicated a new approach. It points out inadequacies of nutritional science and focuses attention of nutritionists to take a fresh look at some of the long accepted nutritional concepts and standards. This has arisen out of the fact that in spite of rigorous fortification of foods with vitamins and minerals widespread deficiencies in iron, folic acid, thiamine and calcium have been detected. The concept of nutrition is rooted to the finding that the deficiency of a single chemical, namely, vitamin or mineral, is the cause of a particular disease and the supply of the particular chemical in appropriate quantity, usually very small, cures the disease. This concept apparently ignores the possibility that the vitamins and minerals interact amongst themselves as well as with their biochemical and physiological milieu. Food technology has vigorously gone ahead with this concept by producing more and more sophisticated and

¹ Hall, R. (1975). Is nutrition a stagnating science? *New Scientist* (Reprinted in the *Hindu*, January 19, 1975).

refined foods while adding chemicals to fortify them. In USA 1,800 chemicals are now routinely added to foods and several thousands are available for special purposes. As a result the body chemistry has to adjust itself to rapid changes in food technology and cope with all these foreign substances. It is, however, known that vitamins and minerals essential for the body number only 16 and 17 respectively. From the observations made on the Statewise energy and protein intakes and the Canadian case for rethinking in the field of nutritional science, there seems to be some virtue in not trying to enforce a uniform standard of calorie and protein intakes. Greater attention should, in fact, be paid to local foods which are often more beneficial from the point of view of nutrition.

Economics of Nutrition

9.2.13 Providing an individual or a family with good nutrition or satisfactory balanced diet does involve certain economic considerations. The income of the individual or his purchasing power will largely influence the pattern of food consumed. Nutrition educators often have to face the question as to whether the prescribed balanced diet is within the financial capacity of the consumer. On the other hand, one also hears the optimistic utterance of the nutritionist that Nature is bountiful in providing a variety of less expensive foods rich in essential nutrients within the reach of practically everyone. In order to choose items of food from locally available resources which more or less fulfil nutritional needs, knowledge gained through years of experience by local people would be a good guide supplemented by the information on nutritive values of food materials obtained by sophisticated chemical and biochemical analyses. From the point of view of the individual, income appears to be the greatest limiting factor in providing a nutritionally balanced diet. Surveys have shown that an individual or a family unit spends at least 65-80 per cent of income on food budget, particularly in the low income groups.

9.2.14 The cost of a balanced diet for an adult male doing moderate work can be worked out assuming certain prices for each component. Being intermediate between sedentary and heavy manual workers, the data for moderate workers serve as good averages and may hold for a normal adult man. The calculated cost are, however, beyond the buying capacity of a large section of the people, considering the line of poverty drawn by Dandekar and Rath.¹ The above calculation have not taken into account the regional variations in prices. For buying the same total energy, one may have to pay much less than another, because of the price differential in

¹ Dandekar, V. M. and Rath, N. K., (1971) Poverty in India. Economic and Political Weekly, Bombay, for Indian School of Political Economy.

different places for the food constituent(s) contributing to the major share of energy. Consequently, in so far as the supply of energy is concerned, the poverty line cannot be drawn rigidly. Moreover, it is not correct to draw such a line on the basis of energy alone without taking into account protein intake. According to Panikar¹, "a monthly per capita consumption expenditure at 1961-62 prices of Rs 8 to 11 in the rural areas and of Rs 15 to 18 in the urban areas of Rajasthan is estimated to provide a diet with 2,250 calories* (the poverty cut-off point) at the other end in Kerala the per capita consumption expenditure at which the minimum calorie needs are met is between Rs 34 and Rs 43 in the rural areas and between Rs 43 and Rs 55 in the urban areas. It is not, therefore, surprising that the proportion of the rural population lying below the poverty line, defined in terms of the specified nutritional norms, is only 13.29 per cent in Rajasthan while it is as high as 90.75 per cent in Kerala; the corresponding percentages for the urban population in the two States are 21.84 and 88.89 respectively". The differences in the rural and urban costs are worth noting.

9.2.15 The alternative approach to an understanding of the economics of nutrition, as illustrated by Panikar in respect of Kerala (*loc. cit.*), commends emulation elsewhere. For this purpose, the minimum number of nutrients and their recommended amounts including the total calorie intake are listed. Also listed are the available food materials including the local ones, and their nutrient contents. For a large number of Indian foods, the latter are available in the booklet† published in 1971 by the National Institute of Nutrition, Hyderabad. It is then merely a computation of the combination of foods that would give the required balanced diet. Obviously, a number of such combinations would be obtained. The cost is then minimised by the method of linear programming as indicated by Panikar (*loc. cit.*) The minimum cost diet, as it almost always happens, suffers from a serious drawback. It lacks palatability and hence, even if most economical, would not be acceptable. Keeping palatability and diversity in view, the most economical diet may be varied in composition by substituting a more palatable for a less palatable one and so on. Naturally, the cost would also rise. But with a little experience, it is possible to come out with a number of diets having the same nutritive value but with greater degrees of acceptability and hence higher costs. These diets are, thus likely to suit a wide range of pockets and taste, and manable to choice by the consumer. It is worthwhile to carry out this kind of exercise on the basis of a region where the food availability is of similar pattern. Individuals can make their choice according to income.

1 Panikar, P. G. K. Economics of Nutrition, *Economic & Political Weekly*, Annual Number 1972.

* Plus protein intake of 44 gm.

† Nutritive Value of Indian Food

9.2.16 There is, however, yet another side to this ticklish problem. Higher incomes do not invariably bring in changes for better nutrition. There are enough surveys which indicate that in urban regions and with higher incomes, the share of expenditure on non-food items tends to go up. This is not to decry the trend for urbanisation for it has in its trail brought some significant changes in nutrition by breaking certain food fads and prejudices. Besides this, the pattern of consumption of cereals shows change for the better. Urbanisation brings in mixed cereal consumption pattern as against undue dependence on a single cereal as in rural areas. Also, the levels of consumption of pulses, milk and eggs tend to go up in urban areas. These tendencies are particularly noticeable in the upper income groups of the urban population, whereas urban low income groups and daily wage earners suffer from inadequate nutrition owing to lack of buying power.

3 EFFECTS OF MALNUTRITION AND COST OF MALNUTRITION

9.3.1 Extensive surveys carried out in different parts of the country during the last several years have shown that large sections of the population consume diets which are quantitatively as well as qualitatively deficient. The consumption of such deficient diets for long periods is reflected in the wide prevalence of malnutrition and ill health. The incidence of nutritional disorders is invariably high in low income groups which form bulk of the population. Malnutrition of varying degrees can affect the general health of the population in several ways. The cost of malnutrition for a developing country is of great concern. The multifarious effects of prolonged malnutrition are evident in several indices of health of the population. Important among them are: high infant mortality rate; low survival in low income groups; high maternal mortality; high incidence of blindness in children; high incidence of anaemia in children, and pregnant and nursing women; retarded growth in children; greater degree of dropouts from schools; greater susceptibility to frequent infections and consequent absenteeism in factories and lowered efficiency in work output etc. The liability of rehabilitation of millions of the blind and the cost of treatment of infections and illnesses highly prevalent in low income and malnourished groups of the population are all positive evidences of the cost of general and chronic malnutrition. The loss of a few thousands of young agricultural labourers due to lathyrism, a permanent crippling paralysis, in parts of Madhya Pradesh is yet another instance of the cost of malnutrition in terms of lowered labour productivity of the region. A satisfactory diet for good health definitely demands a price from the consumer. The economics of nutrition or what good nutrition costs to the consumer is immediately perceptible but not so the economics of malnutrition.

Nutritional Disorders

9.3.2 The effects of undernutrition are not discernible on the surface. The damage due to undernutrition percolates deep, slowly but surely, and it is necessary to appreciate this before it is too late to be remedied. Some of the major nutritional disorders noticeable in India are: protein-calorie malnutrition; vitamin A deficiency; anaemia in children, pregnant and nursing women; B-complex deficiency; phrynodermia (toadskin); rickets; goitre and dental caries. The need for a protein-calorie balance in diet has been emphasised. A departure from this balance as well as deficiencies of protein and calorie in the diets of 1-5 years old children leads to what has been called protein-calorie malnutrition (PCM) (vide map at Appendix 9.9). A high rate of mortality and morbidity among children of the low income group is due to this defect. Surveys carried out by the ICMR at two rural centres in Delhi and Hyderabad, and four urban centres in Calcutta, Bombay, Poona and Vellore have shown that the child gets insufficient food as a whole. The supply of protein is just sufficient in three centres and marginal in the other three, as will be evident from Table 9.7. Vitamin A deficiency, which is as high as 8 per cent in children below six years, is essentially a problem in children since its requirement is highest during the period of rapid growth. Of the other disorders associated with food and water intake, lathyrism and endemic fluorosis deserve mention, both of them being caused by the presence of toxic substances.

TABLE 9.7

Per capita Calorie and Protein Intake of Pre-school Children (1-5 years).

Centre	Total calorie	Total protein (gm)
Calcutta	588	24.0
Delhi	946	28.5
Bombay	773	17.9
Poona	813	19.4
Vellore	764	19.4
Hyderabad	725	19.4
ICMR recommendations	1,275	25.0

Nutrition Leakage

9.3.3 Nutrition is not necessarily assured even if food materials are of the right quantity and quality. The consumer must be in the right frame of physical and environmental health to utilise them properly and derive full benefit. He should be free from infections which interfere with food

digestion and from wasting diseases which adversely influence his metabolic activity. A polluted surrounding would similarly tell upon his biological capacity to utilise nutrients. Improper processing of food is another way by which nutritional losses occur (Section 4). Unless, therefore, the physical wellbeing, environmental sanitation and food processing are simultaneously improved nutrition leakage is inevitable. The problem of malnutrition cannot be solved so long as this devitalising leakage remains unchecked.

4 CONSERVING QUALITY AND NUTRIENTS OF FOODS

9.4.1 Between food production and food consumption, there are several operations which require careful consideration in the context of nutrition management. They are harvesting, storage, processing such as parboiling, milling, dehulling, preservation on household and bulk scale, and lastly, handling in the kitchen or cooking. It is appropriate to examine in detail the nature of these operations, the extent of losses especially in quality and measures to overcome them.

9.4.2 Field losses of grains caused by birds and on threshing floors are roughly 5—10 per cent. But quality deterioration arising from inadequate drying may be considerable due to microbial and fungal action and development of undesirable odours and often toxic substances. The traditional method of sundrying is still largely practised. However, in cloudy weather or owing to continuous cropping, there is likely to be dearth of threshing and drying facilities. These difficulties may be overcome by use of simple mechanical driers at cheap cost using paddy husk or other available materials as fuel. After drying, the grains are to be stored by farmers in their own houses. The storage structures used are mostly made of indigenous materials. Unless the optimum dry conditions are maintained the stored grains are liable to fungal attack. Improved indigenous storage bins are available but the cost of making them should be within the means of ordinary farmers. Rodents might play havoc not only by consuming food but also by carrying infection, thereby lowering the quality of stored grains. Measures to reduce rat population and rat proof storage arrangements are the only answer to this menace.

9.4.3 In the storage stage, there is yet another danger due to insects. In addition to damage to grains resulting in the lowering of quality, some of the insects are known to produce toxic metabolites which remain even after the death or elimination of the insects. Measures to control insects should, therefore, be taken simultaneously with storage. Insect pests are easily controlled with pesticides and fumigants. But pesticides are likely to lead to pollution of food and environment, unless appropriate precautions are taken.

Effect of Cooking on Nutrients

9.4.4 Except for a few items such as fruits, raw vegetables and salads, foods are eaten in the cooked form. Cooking methods which vary from one region of the country to another involve such processes as boiling, steaming, frying, baking, roasting etc. Cooking has some distinct advantages; for instance, it makes the food easily digestible, tasty and appetising; destroys pathogenic bacteria; improves nutritional quality by destroying some proteolytic inhibitors present in some pulses. However, changes brought about by cooking may also tend to destroy some essential nutrients. But simple precautions can easily preserve most of them in tact. Culinary art has, in diverse ingenious ways, provided foods of varied kinds and tastes, often without paying conscious heed to nutrition. A menu for a full meal, breakfast or snacks offers a variety of choices, as regards ingredients and modes of preparation. However, several of these preparations evolved through experience imperceptibly contain good amounts of nutrition. With proper understanding of nutrition one could consciously improve nutritional quality without impairing their gastronomic importance.

5 FOOD PRODUCTION PATTERN AND NUTRITION

9.5.1 Dietary patterns are governed by availability of foods, population to be fed, systems of distribution, economic factors and food habits. The nutritional status of the population except for cities and towns is, therefore, in general, directly related to the dietary patterns of the region. The latter in turn are related to food production patterns. The localisation of agricultural production is, by and large, a consequence of the available resources and inputs, either through natural means, or through technological innovations or both. There is, therefore, nothing unusual about localisation, but owing to lack of a rational system of distribution coupled with chronic shortage and unbalanced population load, the per capita availability tends to be unequal.

Pattern of Diet

9.5.2 The staple food of a region is more often determined by the predominant food crop of the region. Thus, wheat is the staple of the north, millets of the central regions and the Deccan, and rice of the south and southeast regions. The overall availability of the major items of foods is governed by population size and economic condition. They are examined in relation to the requirements of a balanced diet as laid down by the ICMR

in 1968 (Appendix 9.1). The balanced diets shown in Appendix 9.2—statements I to IV are for various age, sex, occupational and vulnerable groups of the population. For the entire population covering these various groups an average balanced diet may be formulated from these individual diets by weighting them in the usual way. Such a diet may not be within the reach of a large bulk of the population for two very important reasons: (a) lack of buying power on the part of the consumer, and (b) local availability of the items prescribed. But diets of an improved nature may be formulated using locally available staples and keeping the cost at a moderate value. These diets would obviously try to maintain the calorie and protein requirements at the recommended level. In Appendix 9.6—statements I to II are presented the monthly requirements for improved diets available at moderate cost, based on rice, wheat and millet as staples. Two diet compositions differing in rice-jowar mix have been suggested for the millet based region. These diets, except that for the Kerala region, are vegetarian and, therefore, include only milk amongst foods of animal origin. However, according to availability and buying power of the consumer, egg, meat and fish can be easily incorporated, replacing some of those listed. In fact, there are possibilities of replacing one item by another, either partly or wholly, e.g., groundnut by milk, provided it is available and suits the consumer financially. Even though Kerala diet is rice based a good proportion of rice can be replaced by tapioca which is cheaper and is produced to the extent of 6 million tonnes. Surprisingly enough, tapioca does not figure as an item of food supplying energy but as vegetables, like other tuber crops. Potatoes including sweet potato are similarly energy giving food and are produced to the extent of 10 million tonnes.

9.5.3 The improved diets, as mentioned above, are based on the nutritional standard prescribed by the ICMR. As such the total calorie and protein intakes have been pitched high, varying from 2,390 to 2,475 and 55.2 gm to 71.7 gm respectively. In view of what has been said in an earlier paragraph about calorie intake variations from one State to another, there is considerable scope for reducing the calorie content, especially of the southern regions including Kerala. Owing to the higher price of rice the cost of food having nearly the same calorie and protein contents is 20-30 per cent more. By reducing the amount of rice and increasing that, for example, of pulses and sugar by suitable amounts, the cost can be brought down to the wheat based diet keeping the calorie at the required low level.

Total Cereals Requirement

9.5.4 From the composition of improved diets, it is possible to calculate

the total requirements of each constituent for attaining nutritional sufficiency. Of all the constituent, cereals occupy an important position by virtue of the fact that they supply more than 60 per cent of the total calorie requirement. The discussion that follows, therefore, centres round cereals requirement; those of the others can be assessed on the same basis as cereals. Before calculating cereals requirement, attention is drawn to the average intakes of calorie per capita per day of the population in different States given in Table 9.1 and to the composition of improved (vegetarian) diets based on rice, wheat, millet and rice and tapioca (for Kerala only) presented in Appendix 9.6—statements I to V. For the purpose of the present calculation, the States are grouped as shown in Table 9.8.

TABLE 9.8

Average Calorie Intake and Population of Different States

State	1971 population (000)	Average calorie intake	Diet based on	Staple production
Andhra Pradesh . . .	43,503	2,040	rice	rice
Assam . . .	14,958	—		
Bihar . . .	56,353	1,865		
Orissa . . .	21,945	—		
Tamil Nadu . . .	41,199	1,498		
West Bengal . . .	44,312	1,927		
Manipur . . .	1,073	—		
Meghalaya . . .	1,012	—		
Nagaland . . .	516	—		
Tripura . . .	1,556	—		
Union Territories . . .	6,342	—		
Total . . .	232,769	1,832 (mean)		
Uttar Pradesh . . .	88,341	2,307	wheat	wheat
Punjab . . .	13,551	2,832		
Himachal Pradesh . . .	3,460	—		
Jammu & Kashmir . . .	4,617	2,265		
Total . . .	109,969	2,468 (mean)		
Gujarat . . .	26,697	1,612	millet (jowar) and wheat	jowar and wheat.
Haryana . . .	10,037	—		
Karnataka . . .	29,299	2,220		
Madhya Pradesh . . .	41,654	2,779		
Maharashtra . . .	50,412	2,281		
Rajasthan . . .	25,766	2,044		
Total . . .	183,865	2,187 (mean)		
Kerala . . .	21,347	1,842		rice and tapioca
				rice and tapioca

The mean calorie intakes of the population group consuming rice, wheat, millets, rice and tapioca as staple cereals are respectively

1,832, 2,468, 2,187 and 1,842. They once again illustrate the difference and at the same time show that except the wheat based group the rest consume much less calorie than prescribed by the improved diets for the various groups. In fact, the composition of the improved diets has been adjusted on the basic premises that the calorie and protein intakes by all of them must be identical and near about 2,400 and 55 gm respectively. The surveys on the basis of which data in Table 9.1 were computed are intended to focus attention on the per capita nutritional level in each State, especially with reference to calorie and protein intakes. The norms stated above are based on these surveys. What these surveys showed, in addition, is that even with lower calorie intake, but not that of protein, normal healthy existence can be assured. This is because the actual needs as influenced by ambient temperature: body weight, etc. of the population in some of the regions are less than the norm set for the entire country. There are people whose calorie intake may be even less because of low buying power. The annual cereal requirements calculated on the basis of the mean calorie intakes by each group are shown in Table 9.9.

TABLE 9.9
Annual Cereal Requirements

Group	Rice	Wheat	Jowar	Tapioca	(million tonnes)
rice based	22.24	6.35	—	—	
wheat based	3.99	13.95	—	—	
millet based	9.17	—	18.35	—	
rice & tapioca based	1.50	0.30	—	0.90	
	36.90	20.60	18.35	0.90	

The total cereal requirement (excluding tapioca) is thus 75.85 million tonnes. The per capita per day requirement of cereals (excluding tapioca) comes out to be 379 gm which more or less agrees with the suggested cereals consumption for a balanced diet (vide Appendix 9.3). The total cereal requirement on the basis of data on improved diets in Appendix 9.6—statements I to V is about 88.8 million tonnes. The difference is appreciable, and gives the impression that the latter is unnecessarily exaggerated. The total cereal requirement for the increased population (574.2 million) in 1973 according to the reduced calorie intakes is 79.0 million tonnes, which is somewhat lower than that year's total cereal production, namely, 87.1 million tonnes. Assuming 12½ per cent of gross production for seed, feed and wastage the requirement would be 90.3 million tonnes, which exceeds the production by 3.2 million tonnes. If the production of 4.45, 2.08 and 6.37 million tonnes of the essentially calorie 11—131 Deptt. of Agri./76

giving potato, sweet potato and tapioca respectively is taken into consideration, the production of the principal energy yielding food materials will not be in deficit.

Costs of Improved Diets

9.5.5 The costs of the improved diets were initially calculated in 1968-69, when the improved diets were prescribed by the ICMR. Even for comparative purpose those values are no longer useful. They have, therefore, been recalculated taking average consumer price, 1973-74, published by the Ministry of Labour and given in Table 9.10 (vide Appendix 9.6). The differences between the costs of diets in 1968-69 were not much but they have obviously widened as a consequence of the price differential of commodities.

TABLE 9.10
Cost of Improved Diets

Diet	(rupees per month)	
	1968-69	1973-74
rice-based (southern)	39.45	63.39
wheat-based northern)	37.20	52.33
millet-based (I)	37.80	55.66
millet-based (II)	39.25	59.85
Kerala region	39.25	68.70

Nutrition-oriented Agricultural Production

9.5.6 From a comparison of the requirements on the basis of improved diets and production of food crops, it is observed that the country has been facing a marginal deficit* of cereals and to a greater extent of pulses. The deficit is likely to be of wider magnitude in the case of protective foods such as vegetables, milk and other foods of animal origin and also in the case of edible oils and fats. It must, therefore, be emphasised that the first priority in production planning is to meet the quantitative deficit in calorie or energy requirement. Nutrition-oriented programmes of agricultural production as well as of consumption have to be emphasised for the purpose of ensuring adequate amounts and superior quality of cereals, pulses, oilseeds, fruits and vegetables, milk, meat, egg., and fish. Cropping programmes enabling diversification, wherever possible, need to be encouraged in view of nutritional significance. Nutrition-oriented food production and consumption planning should be initiated at the district level.

* Paragraph 9.5.4.

9.5.7 It is observed that some of the improved varieties of cereals are not only high yielding but also nutritionally superior to the older varieties. Nutritional quality has been examined in terms of total protein content and favourable amino acid profile. The other nutrients examined have been mainly vitamin B complex content in rice varieties, and iron and calcium contents in ragi varieties. It is no doubt possible to favourably alter the nutrient, particularly protein, content of cereals by breeding. Wherever feasible, technologically and economically, advantage should be taken of such researches. But it must be borne in mind that the contents of nutrients, e.g., of protein, cannot be raised so high in the case of a single cereal or any other grain that the full requirement of nutrients would be met by it alone. A diversification of foods is desirable even for the same nutrient, not because of taste but for the sake of complementarity, as is especially true in the case of proteins.

Consumer Acceptance

9.5.8 An important aspect in new varieties of crops is consumer acceptance which has been thoroughly examined in the case of wheat, rice and ragi. Dough-making qualities, baking or chapati-making qualities, and colour have been important factors in wheat varieties. In rice, cooking quality, fine grain quality and amylose content have been important considerations. Similar factors play important part in the matter of consumer preference for one variety to another.

Edible Oils

9.5.9 The purpose of increasing the production of edible oils from plant source has great nutritional significance. It is estimated that for good health 5 gm of polyunsaturated fatty acids (PUFA) are required per adult per day. Vegetable oils are generally good sources of PUFA. Most prominent among them are those of safflower and soyabean oils having about 75 and 45 per cent PUFA respectively. Certain varieties of safflower, oils of which are high in PUFA, may for this reason be encouraged even if the yield is relatively low. The possibility of combining high yield characteristics with that of high PUFA content by means of genetic manipulation may be explored. The usual sources of edible oils for the production of hydrogenated vegetable oil are groundnut, cotton seed and soyabean. But since during hydrogenation the original degree of unsaturation is considerably reduced, the hydrogenated products have to be fortified, as is the practice, with adequate amounts of PUFA and also vitamins A and D. It is possible to produce oils with the desired fatty acid profile, as in those from plant sources, by using certain species of *Pseudomonas*. This possibility may be explored to meet at least the needs

of soap industry. The economic feasibility and viability for large scale production have to be carefully examined before launching production on an industrial scale.

9.5.10 Some antinutritional and toxic factors are usually associated with some of the oilseeds as indicated below :

Oilseeds	Antinutritional and toxic constituents
groundnut	aflatoxin
cotton seed	gossypol
sesamum	high oxalic acid in seed coat
Oilseeds	Antinutritional and toxic constituents,
rapeseed & mustard	high erucic acid and antithyroid factors thiooxazolidones isothiocyanates
soyabean	trypsin inhibitor
linseed	linimarin, linase
castor	ricinine, ricin, allergen

Except mustard or rapeseed oil, the antinutritional constituents do not generally pass into the oil, but are largely retained in the cakes, and can be processed for elimination or detoxication by either heat treatment or microbiological action. Genetic improvements have yielded gossypol-free cotton and low aflatoxin containing groundnut. The antinutritional effect of erucic acid has perhaps been overplayed. Poland is one of the countries which consumes exclusively rapeseed oil to the extent that erucic acid content may be as high as 10 gm per capita per day. Zero erucic acid varieties of rapeseed have been developed, but since the oil content is lowered thereby, it is unlikely from the points of view of economics as well as nutrition, that an urgency has been felt to accept the Zero erucic acid variety. It is often found that if the food is otherwise complete, some of the so-called antinutritional factors as distinct from toxic factors, need not cause unnecessary worry. In fact, too much refining for the sake of avoiding antinutritional factors may be undesirable.

Oilseed Meals

9.5.11 Oilseed meals are important by products of the oil industry. They are good sources of protein and can be used directly as feed for milch cattle and poultry. With a little processing, the oil seed meals can be made into edible grade food for human consumption. It is estimated that this source provides about 4 million tonnes of protein-rich (nearly 17 per cent) food at the current rate of oilseeds production. Out of this, about one million tonnes are exported, 1.5 million tonnes are converted into animal feed and a similar quantity processed as source of protein for human consumption. Increased production of oilseeds every year has the dual advantage of meeting oil requirement as well as increasing the availability of protein-rich meals. Deoiled and processed groundnut, soyabean,

sunflower, cotton seed meals and deoiled rice-bran meal may be used in the production of protein-rich blends of foods for the nutritional rehabilitation of children. Sizable quantities of oilseed meals are exported. In the context of widespread protein-calorie malnutrition steps should be taken to promote internal consumption of oil cakes through extension and education. At the same time it would be worthwhile to process the oil meals for export rather than sell them cheap as raw materials, because processed meals would sell at much higher prices. It is important that the deoiled meal flours are thoroughly screened with regard to toxic substances. The protein Advisory group of WHO/FAO has laid down safe limits for aflatoxin and gossypol, in case deoiled meals are used for human consumption, the premissible limits being 30 parts per billion in total diet for aflatoxin, and 0.045 per cent free and 1 per cent total for gossypol.

Oils

9.5.12 There is vast scope for exploring new sources of edible oil, e.g., sal seeds (*Shorea robusta* Roxb), walnut (*Juglans regia* L.), oyster nut seed (*Telfairia pedata* Hook), pumpkin seeds (*Cucurbita maxima* Duchesne), water melon seed kernel (*Citrullus lanatus* Thunb Mansf.) nutmeg (*Myristica fragrans* Houtt) mace (*Myristica malabarica* Lamk), palm kernel (*Borassus flabollifer* L. *jungli badam* (*Sterculia foetida* L.), mahua seed kernel [*Madhuca longifolia* (L) MacBrade] etc. Some of the new sources of nonedible grade oils would prevent diversion of edible oil for soap manufacture and other industrial uses.

Solvent Extraction

9.5.13 The indigenous process of oil extraction and the small extractors used are less efficient, because of residual oil in the cake. However, the oil yield can be stepped up by at least 10 per cent by solvent extraction which would appreciably extend edible oil supplies. For such extraction, it is essential to use only "food-grade" solvents which should necessarily be produced in the country in order to make the process self-reliant and economically viable.

Vegetables

9.5.14 The importance of vegetable from the point of view of nutrition is well recognised. Reliable data on production of most of the vegetables are however, not available. Data from consumption trends indicate per capita intake of about 50 gm per day, which is far below the recommended intake in a balanced diet. The production of leguminous vegetables such

as French beans, guar, field beans, broad beans etc. must be encouraged since they, as a group, contain more protein compared with other vegetables. There is great need for intensive research on high yielding varieties of most common vegetables, even with the current low production of vegetables, the greatest bottleneck appears to be quick transport system, cold storage facilities and efficient marketing system. The kitchen garden, community garden and school garden schemes under the Applied Nutrition Programme have not made the desired impact on the production of vegetables, despite the free supply of seeds through United Nations Children's emergency Fund (UNICEF). The emphasis on vegetable production in any agricultural development programme is so little that other inputs, such as water and fertiliser, if available would be diverted to cereals and cash crops rather than vegetables. The prevalence of vitamin A deficiency and anaemia in large sections of the population can be considerably reduced, if the intake of green leafy vegetables is increased to even 50 per cent of the recommended allowances. Green leafy vegetables are the cheapest of all vegetables but their consumption trends show very low intake. Research and extension efforts should be intensified to increase production and consumption of green leafy vegetables.

9.5.15 Of the cultivated fruits only mango, banana and citrus occupy appreciable areas but their production has not increased during the last five years. The nutritional value of these and some other low cost fruits is to be emphasised in nutrition education. Thus, mango and papaya are good source of betacarotene, while citrus and guava are rich sources of vitamin C. The existing pattern indicates that large scale production of fruits is limited to certain regions. Cultivation of less expensive but nutritive fruits such as custard apple, *ber* and *sapota* should be encouraged. High yielding and short duration varieties of the more common fruits should be evolved by intensifying research work on them. Facilities for processing, storage, transport and marketing should simultaneous be ensured in each production centre. The production of nuts such as cashew, which are both protein-rich and oil-bearing, has also to be increased. Their present restricted production, high market price and good export market limit their internal availability to middle and upper income groups.

Foods from Animal Sources

9.5.16 Of the foods from animal sources, which have high nutritional value, milk, egg, fish and meat are the most important. Measures to ensure their increased production are well known and have been on the anvil, but for various reasons they have not made the desired progress. The factors, responsible for low production of inland as well as marine fishes have to be eliminated. The production of milk, egg, fish and meat has to

be considerably increased in order to meet nutritional requirements in respect of each of these items of food. Production alone of these easily perishable foods is not enough. Unless less expensive methods of preserving them are assured, besides arrangements for processing, storage, transport and marketing, production is going to have a set back even in the presence of adequate inputs.

6 NEW FOODS

9.6.1 Alternative sources of foods, some of them new and semiconventional are being increasingly referred to for reducing the pressure on land. These are, for example, deoiled oilseeds flour, vegetable protein flour and leaf protein, which have sufficient nutritive value and, after processing, can be used as animal feed as well as for human consumption. Then, there are those produced by chemical synthesis or mass culture of micro-organisms. These include petroproteins, algae, plankton, yeasts, moulds, etc. Very few of these new and semiconventional foods have as yet established themselves too well for industrial exploitation. The present contribution from the semiconventional foods to the food supplies of the country is negligible. A recent analysis by Slessor¹ shows that most semiconventional proteins are energy intensive. It may, therefore, be doubted whether India is in a position to undertake mass production of these foods in the face of general energy shortage. However, a selective choice can be made of such foods which draw most of their energy input from the sun, e.g., leaf protein and algae.

9.6.2. Notwithstanding disadvantages, research on the possibilities of production of new foods and their utilisation is to be encouraged. Some of them have definitely good potential for utilisation as animal feed. The general considerations in the exploitation of these new foods are:

- (a) economic viability for commercialised production;
- (b) manner of use of the products;
- (c) safety and toxicological evaluation;
- (d) nutritional evaluation; and
- (e) marketing, distribution and sales promotional problems, consumer acceptance, etc. Even though high in cost of energy for production in bulk, algae, yeast, mushroom and petroproteins deserve further consideration in view of the tremendous progress made to utilise them as source of food in some other countries.

Leaf Proteins

9.6.3 Research on leaf proteins is about 40 years old but only recently

¹ Slessor, M. (1973), *J. Sci. Food & Agri.* 24, 1193

some commercial units for making leaf proteins have become available. In essence, the process of extraction involves pulping of fresh green leaves—both edible and nonedible—pressing the juice out and straining to remove the residual fibre. The juice is heated to about 80°C whereby the protein is coagulated. It is then filtered off and washed repeatedly. The final product is a dark green cake with practically no smell or off-taste. Recent modifications include coagulation by steaming at pH 4.5, which results in a product with good keeping quality. Drying can be accomplished at this stage by a number of methods. Freeze-drying produces the most acceptable product. Nutritional studies reveal that leaf proteins have a biological value of 71—82 per cent and PER (Protein Efficiency Ratio) at 2.16 (against 2.70 for skim milk). The lysine levels range from 5.3 to 7.1 per cent, methionine 1.3 to 2.7 per cent and tryptophan 1 to 2 per cent. Leaf proteins have been used in Jamaica as supplements to diets of children suffering from protein-calorie malnutrition. Results of these studies show as good a response as milk proteins. The primary defect appears to be in absorption for instance, absorption for milk formula is 88.3 per cent as against 83 per cent for leaf proteins formula. Acceptability trials show that the recipes most favoured are soup, stew, curry cube, banana/apple mixture constituent of pastries, etc. The only disadvantage is the colour. The experiments done in 1968 at the Central Food Technological Research Institute (CFTRI) at Mysore confirm the nutritional quality of leaf proteins and their acceptability as food additives.

7 DISTRIBUTION, HYGIENE AND QUALITY CONTROL OF FOODS

9.7.1 From the stage of production in the farm, foods pass through processing followed by distribution. It is, therefore, appropriate to consider the following important aspects; internal distribution of foodgrains in the country; food hygiene and quality control in hotels and restaurants or public eating places; food adulteration and measures for prevention; food industries; and fortified foods.

9.7.2 The Government has adopted several measures for securing satisfactory internal distribution of foodgrains in the country. The creation of buffer stocks and food zones, rationing and the opening of fair price shops are some of these measures. The setting up of the Food Corporation of India in 1965 charged with wide variety of functions and responsibilities, namely, the sale, purchase and distribution of foodgrains, pulses, oilseeds edible oils, maintenance of adequate bufferstock and quality of stored materials, installation and modernisation of rice and flour mills, manufacture and distribution of processed foods, was evidently a big step forward

in the direction of food distribution and maintenance of quality. The current distribution system, though not free from loopholes and bottlenecks, tends, however, to cater largely for the nonfarm population in urban areas.

Food Hygiene and Quality Control

9.7.3 Food safety and wholesomeness of foods are essential for health. The consumer has a right to expect food safety, wholesomeness and quality in all the foods he uses. Besides, the consumer has occasionally to eat outside, in places of work, in hotels, restaurants and public eating places where he expects safe food to be served. The Food Corporation of India (FCI) as the major buyer of foods in bulk has set up its own standards for wholesomeness. This organisation has its own laboratories manned by trained personnel to test for quality and maintenance of standard. To cite a typical example: Before bulk purchase, the Corporation enforces the following standards in the case of rice:

- (i) moisture content of the grain should not exceed 16 per cent;
- (ii) yellow or discoloured rice should not be more than 15 per cent of the total;
- (iii) percentage of broken grains should be minimum;
- (iv) appearance of grains should not be chalky white;
- (v) uric acid content which is an index of storage period and degree of insect infestation should be minimum or traces;
- (vi) percentage of damaged grains should be minimum;
- (vii) foreign matter, e.g., faecal droppings of rodents, stones, grits, etc. should be absent; and
- (viii) inferior quality grain should be absent. In practice, however, at the consumer's level the quality is found to be hardly satisfactory. Relaxation of standards by those concerned is thus indicated. An important agency like FCI concerned with bulk handling of nation's food should rigorously enforce specifications in terms of quality, mainly from the point of view of health and nutrition at the consumer's level. Other sources of supply of foods should be similarly controlled as regards the quality.

Food Contaminants

9.7.4 Food contaminants normally encountered are naturally occurring toxins, pesticide residues, fungal toxins and radioactive contamination from fallout or irradiation. Typical instances of naturally occurring toxins are neurotoxin in *Lathyrus sativus*, *Khesari* dal, and cyanides in cassava. Harmful constituents could be removed by repeated washing with water.

The most common pesticide residues in foods are those of DDT and organophosphorus chemicals. These are referred to as persistent residues since normal washing with water before use does not result in total removal of contaminating chemicals. Increased and, more often, indiscriminate use of pesticides for crop protection may result in appreciably high level of residues in foods. Farmers, therefore, should be educated in the safe use of pesticides. There is also need for a continuous surveillance of pesticides residue in most commonly used foods and possible health hazards for the consumer.

9.7.5 Unsatisfactory post-harvest storage conditions lead to contamination of grains by several fungi some of which produce harmful substances in the grains. Most common of them are *Penicillium* spp. in rice and *Aspergillus flavus* in most food crops. In fruits and vegetables, free moisture being available, bacteria and yeast become active and produce poisonous species such as those of *Salmonella*, *Clostridium* and *Staphylococci*. In case of such contaminations, washing with chlorine water is recommended. The quality of stored food is lowered, if attacked by fungi like *Aspergillus*, *Penicillium*, *Fusarium*, *Cladosporium*, *Alternaria*, *Helminthosporium*. Analysis shows increase in fatty acids, water soluble nitrogen and reducing sugar and changes in amino acids and vitamins. Fungal isolates are found to reduce viability of rice seeds. Fumigants like ethylene bromide, ethylene dichloride, chloropicrin and hydrogen cyanide exert cidal effect on bacteria and fungi. *A. flavus* contamination in the form of aflatoxin is more common in groundnut. It has also been detected in cereals, other oilseeds, cassava, casein, coffee, cocoa, beans and red pepper. Till now six types of aflatoxin are known. Improved storage facilities and quick drying after harvest are the only solutions to this problem. Ergot contamination is a serious problem affecting wheat and bajra during preharvest time. Such contaminations in staples are harmful to consumers. Ergot contaminated grains could be removed by hand picking or floatation in 15—20 per cent brine solution. Some safe limits for ergot contamination have been fixed arbitrarily. There is need for further research for a rational and scientific basis for the fixation of safe limits for ergot contamination.

9.7.6 Radioactive contamination might occur due to fallout from nuclear explosion or in the processing of foods by irradiation. The possibilities of contamination in food through fallout need to be investigated in a systematic manner. Irradiation of foods for preservation etc., is likely to be used in the years ahead. The possible harmful effects of irradiation of foods have to be thoroughly examined both in terms of nutritional quality and possible health hazards to the consumer before irradiation of foods is taken up on a commercial scale in the country. If and when irradiation of foods is taken up, it should be made mandatory that such irradiated foods are stored at least for the period of three months before releasing for

public consumption. For both radioactive fallout and possible harmful effects of irradiated foods, appropriate monitoring agencies should be set up.

Legal Steps to Control Food Adulteration

9.7.7 From the wholesale level to the retail, several food articles tend to get adulterated and contaminated. Deliberate addition of extraneous and harmful materials is adulteration. Contamination is more often accidental. The primary motive in adulteration is profit making and the common adulterants used are varied but generally bear close resemblance to the major articles of food adulterated. On an average, about 25 per cent of samples of any food commodity is found to be adulterated. The extent and pattern of adulteration can be judged from the figures given in Tables 9.11 and 9.12 and Appendix 9.7.

TABLE 9.11
Extent of Adulteration in Food in the Country¹

Year	Number of food samples examined	Number of food samples adulterated	Percentage of adulteration
1960	122,110	37,837	31.0
1961	143,955	42,947	29.8
1962	157,482	47,633	31.0
1963	155,903	46,881	30.0
1964	157,214	47,010	29.9
1965	166,972	51,957	31.1
1966	174,758	44,508	25.5

1 Reports of the Director-General of Health Services, New Delhi.

TABLE 9.12
Pattern of Adulteration in Different Foods (1964)¹

Category of foodstuff	Number of samples examined	Number of samples adulterated	Percentage of adulteration
nonalcoholic beverages	1,568	547	34.8
spices and condiments	9,587	2,090	21.9
sweetening agents	1,441	347	24.1
tea, coffee, cocoa	5,413	544	10.0
milk	77,141	30,686	30.7
butter, ghee, icecream and other milk products	14,145	3,408	23.3
edible oils, vanaspati	28,602	4,254	14.8
fruit products	270	46	17.0
cereals, pulses and products	10,426	2,310	22.1
miscellaneous articles	8,531	2,778	32.5

1 Reports of the Director-General of Health Services, New Delhi

9.7.8 Laws exist to prohibit and take penal measures for fraudulent practices in food trade. Tamil Nadu was perhaps the earliest to legislate against adulteration by enacting the Madras Prevention of Food Adulteration Act of 1918. The Act provided for the inspection and control of food offered for sale. In 1932, the Act of 1918 was modified to empower Sanitary Inspectors and Health Officers of local governing bodies such as the Municipality or the Corporation to inspect food markets and to collect food samples for analysis. Legislation against adulteration came up for consideration at the all-India level in the Prevention of Food Adulteration Act of 1954, commonly known as PFA Act of 1954. The Act provided deterrent punishment to offenders. It envisaged the setting up of Regional Food Laboratories under the control of Public Analysts. A Central Food Laboratory at Calcutta was also established. The latter carried out research on food standards and on methods of detecting food adulteration besides being an appellate authority in cases involving adulteration. At present, each State has at least one food and public health laboratory to examine foods for detecting adulteration. Some States have set up regional food laboratories.

Consumer Guidance Society

9.7.9 Food adulteration is a menace to public health and, therefore, intensified efforts have to be made on a national scale for checking the evil practice. Each district should have one public health laboratory to deal with food adulteration. The punishment for adulteration should be more severe than a mere fine of a few rupees, as at present. Public apathy and ignorance often hamper the work of government trying to enforce quality control of foods. A well informed and watchful public and aid the Government agencies in the detection and prevention of malpractices in food adulteration. Consumer awareness of the problem is a great necessity. Consumer guidance societies should be functioning in every urban centre and people should be well educated about the evils of adulteration through exhibitions, films and demonstrations.

National Food Sanitation and Safety Act

9.7.10 At present, the prevention of food adulteration is the responsibility of the State Government. In view of the great risk of food adulteration to public health, the responsibility should be taken up by the Centre in the shape of a National Food Sanitation and Safety Act in modification of the existing PFA Act of 1954, giving protection to the consumer and also necessary powers to concerned authorities for tackling this problem on an emergency footing.

Central Committee for Food Standards

9.7.11 Under the PFA Act of 1954, the Central Government has constituted a Committee called the Central Committee for Food Standards to advise the Governments at the Centre and the States on matters arising out of the administration of the Act. The scope and functions of this Committee have been enlarged to cover food adulteration, food safety and quality control, including matters relating to food processing in so far as it relates to wholesomeness of processed foods. Some typical examples may serve to indicate the scope and responsibility of this Committee: (a) compulsory use of nontoxic food grade solvents for extraction of oil from oilseeds; (b) approval for changes in packing in polythene bags or certain types of canning material; (c) approval for additives in processing or as colouring and flavouring agents, for example, in confectionery, *supari* industry, bakery, fruit processing etc., (d) strict adherence to the melting point (37° C) of hydrogenated vegetable oil meant for direct human consumption and higher melting point ($40-41^{\circ}$ C) for use in bakeries.

Quality Control of Foods

9.7.12 The Indian Standards Institution (ISI) has an important role to play in maintaining quality of food products manufactured in the country. The Agricultural Food Products Division Council (AFDC) of the Institute deals with the quality control of all agricultural and food products both in the public and private sectors. It works with the help of about twenty sectional committees to deal with different groups of food products. Each sectional committee has laid down exacting standards for quality of different types of food products. Despite the exacting standards, more and more food industries in their own interest subscribe to the ISI and are also eager to get ISI certification for their products. This is a desirable trend.

Food Industries

9.7.13 The food and feed industries in India have made rapid progress during the last two decades. Some of the existing major groups of food and feed industries are: (a) edible oil industry; (b) milk, milk products and baby foods based on milk; (c) bakeries and biscuit manufacture; (d) confectionery; (e) beverages such as tea, coffee and soft drinks; (f) brewery and fermentation industry; (g) fruit products (jam, jelly, squash, fruit juice); (h) pickles and papad; (i) breakfast cereals; (j) foods of animal origin; and (k) animal feed. Those of the products which are covered by the ISI specifications are generally considered to be of good quality. It is recommended that many of the products not yet covered by the ISI

and the new ones coming up should be brought under its purview as quickly as possible.

9.7.14 Except perhaps the oil industry the others mentioned above are dependent on surplus produce of the respective commodities. Some of the produce against e.g., milk and fruits (and to some extent vegetables) is perishable and hence have to be processed immediately into products less liable to decomposition. Unless production trends move upward as rapidly as envisaged, the growth of food industries is not likely to be further accelerated. Processed foods are, by and large, more popular in urban than rural areas for various reasons. They include cost, availability and acquired taste. The problem connected with processed foods is their shelflife especially in case of perishable foods. Unless this is satisfactorily solved the popularity of processed foods cannot be assured. In the event of actual surplus, food processing industries in future would have to think in terms of viable units of small and medium sizes to be installed in rural and semi-urban areas.

Fortification and Additives

9.7.15 Improving the nutritional quality of some foods or food products by fortification or enrichment with particular nutrients has given rise to some diversification of food industries. Typical industries currently in operation in this country are: (a) fortification of wheat flour with lysine and iron as in *paushthic atta*. This is being popularised in a limited way by the Food and Nutrition Board, Union Ministry of Agriculture and Irrigation; (b) fortification of bread with iron, calcium and vitamins and being promoted by the Food and Nutrition Board; (c) all brands of vanaspati being fortified with vitamins A & D. There is a move to fortify it with the minimum amount of polyunsaturated fatty acids; (d) fortification of common salt with iodine, iron and calcium has been tried on a commercial scale; (e) fortification of confectionery goods is a new field offering scope for increasing the intake of vitamins A and B complex for pre-school children and the older group of 6—12 years. It is, however, to be pointed out that fortification of cereals is a stupendous task. In a big country like India, it is not only a matter of cost involved in the enterprise, but also the problem of logistics. Considerably technical development should, therefore, precede before it can be pursued and successfully implemented. For example, iodine content of iodised salt suffers loss, especially during summer, due to handling during transport and storage. In connection with fortification of foods it may be profitable to recall the findings of the Nutrition Canada Project, to which a reference has been made earlier (paragraph 9.2.12). There are reasons to question the advisability of refinding foods and then fortifying them to supply

missing vitamins and minerals. The greater the sophistication used to process a food, the greater is the expenditure of energy and hence the cost. On the other hand, because of peculiar cooking and eating habits it is doubtful if the fortifying chemicals are properly utilised. It is, often by force of sheer advertisement that refined and fortified foods are pushed into the market. No followup and monitoring exist to find out the extent to which such fortifications have yielded the desired results. The survey by the Nutrition Canada Project shows that they may not have.

9.7.16 The use of food additives is perhaps as old a practice as the salting, pickling and smoking of foods. However, with the development of food industry, the number of food additives and their use have greatly increased. These food additives are used essentially for preservation, improving taste, flavour and quality. Emulsifiers, stabilisers, flavouring agents, foaming agents, colouring matters, vitamins, antioxidants etc., are examples of the diversified use of additives. The food industry must establish that the additive is essential for processing and, at permissible levels, ensure safety and improvement in quality. The Central Committee on Food Standards has to give its seal of approval for the use of any additive in food processing. It may be possible to learn from the experience of other countries which are using a large number of synthetic chemicals as additives before a large scale venture is undertaken in this regard in India.

Public Eating Places

9.7.17 In urban and industrial areas, a large section of the population depends on hotels and restaurants and other public eating houses for catering to their food requirements. It is, therefore, very important to examine a few basic aspects, viz., (a) quality of the foods served; (b) food sanitation and general hygiene; and (c) health of the catering staff and others employed in cooking, serving, etc. The existing laws relating to hotels and catering establishments require that the latter should be licenced under the State Public Health Act. The most common defects noticed in public eating houses are: (a) unsuitability of the building; (b) unhygienic practice in storage, preparation and the servicing of food; (c) defective or inadequate sterilisation facilities for utensils and other wares used in cooking and catering; (d) lack of facilities for ensuring personal hygiene of the food handlers by periodical medical check up; (e) lack of adequate protected water supply for drinking and cleaning purposes; and (f) lack of suitable arrangements for collection of sullage, food wastes and garbage. There should be a permanent body, for example, the eating houses sanitation committee attached to the municipality or the corporation, to supervise periodically all public eating places and enforce minimum conditions. The State food adulteration inspectors should also keep a check. Besides

this step, there may be model restaurants run by Government agency or corporation or municipality. There should be regular facilities for education of food handlers in catering techniques and hygienic upkeep of catering establishments. It is with this objective that several regional institutes of catering technology and applied nutrition have been set up in the country. Various courses of training are offered in these institutes which have in their staff highly qualified experts in the field of catering technology. The hotel and the restaurant industries are expanding rapidly and it is hoped that institutes of catering technology would have to share greater responsibility for organising model canteens or model catering centres, preferably in industrial locations, and for providing good and nutritious food for workers under hygienic conditions. Industrial managements should take advantage of such a measure in the interest of the industry as well as the welfare of their workers.

8 NUTRITION REHABILITATION PROGRAMMES

9.8.1 Widespread malnutrition can obviously be arrested by increasing production of food crops, fruits, vegetables, milk, meat, fish and egg, and making them available to the needy. But a large bulk of the people who are victims of malnutrition belong to the low income group and the poorer section. Because of lack of buying power, food available in the market would be beyond their reach. Moreover, certain vulnerable groups which, if not helped and rehabilitated at the right time, would become a burden throughout their life and create problems affecting the economy of the country. Such cases need governmental intervention. The vulnerable groups comprising pre-school children (1—5 years), school going children (6—12 years), pregnant and nursing women deserve the first priority. Next in order of priority may be placed the industrial workers and tribal population. The famine and drought stricken areas deserve special considerations and call for emergency relief operations. The Government and the organisations concerned with nutrition relief realise fully that assistance programmes, whatever their nature and dimension, are not the end in themselves, nor do they provide a permanent solution. All nutritions relief projects, therefore, are based on the following principles :

- (i) nutritional and health education of the community;
- (ii) nutritional aid to target groups; and
- (iii) periodical evaluation of the assistance programmes.

National Organisations

9.8.2 The Central and State Governments are the major sponsors of the various nutritional rehabilitation programmes in the country. Volun-

tary organisations within the country contribute very little in this massive effort. At the governmental level, the responsibility for the net work of the nutritional relief programmes is divided and entrusted with several ministries and departments. Important among them are the Departments of Food, Agriculture, Rural Development, Health, Education and Social Welfare. A similar pattern is maintained at the State Government level.

International Organisations

9.8.3 For several years, many international organisations have been actively participating and financing nutritional relief programmes in different parts of the country. Important among them are: (a) United Nations Childrens' Emergency Fund (UNICEF); (b) Voluntary Church Organisations; (c) Cooperation for American Relief Everywhere (CARE); (d) Food for Peace; and (e) Meals for Millions. The nature of assistance from these organisations is in terms of imported milk powder, vitamin tablets, Bulgar wheat, protein-rich food mixtures such as CSM (corn-soya-milk powder), nutro-biscuits, material assistance for raising fisheries, equipment for milk conservation, besides materials for nutrition education. The international agencies referred to above provide all this assistance and operate with the general concurrence of the Government of India.

National Nutrition Programmes

9.8.4 The nutrition programmes operated during the Fourth Plan on a countrywide basis are indicated in Appendix 9.8. It is estimated on the basis of the 1971 census that the number of pre-school children (1—5 years) is of the order of 100 million in India. Of this, 80 million are from rural and tribal areas. It is also estimated that about 50-60 million pre-school children are from the low income groups. On the basis of several diet surveys in this group of population, it has been shown that the nutritional deficit is more marked in calories and vitamins than proteins. The calorie deficit is of the order of 300-400 calories. The Nutrition Expert Group of the ICMR, therefore, has recommended supplementary feeding to provide 300 calories and 8-10 gm protein per day per child for 300 days in a year. This supplement can be made up of a wide range of locally available foods and food products. The National Institute of Nutrition, Hyderabad, has evolved a recipe made from flours of wheat, roasted green gram, roasted groundnut, and jaggery and made into *ladus*. Several such recipes from locally available foods have been formulated. In Kerala region, the CARE has been successfully using a Kerala Indigenous Food (KIF) mixture which consists of 50 per cent tapioca, 25 per cent groundnut, 25 per cent soya fortified Bulgar wheat and a vitamin-12—131 Deptt. of Agri./76

mineral mix. This mixture, as served gives 17 gm protein and 400 calories per child and costs 15 paise per child. The CFTRI, Mysore, has developed *Balahar* which is a low cost high protein well balanced mixture of locally available cereals, edible oilseed meal, skim milk powder and pulses and fortified with vitamins and minerals. The trial production of *Balahar* was undertaken by the Food and Nutrition Board in collaboration with the Food Corporation of India. It is being regularly manufactured since 1969 in increasing quantities to meet increasing demands. In order to suit local condition and availability of ingredients, three formulations are now in use¹. The standardised formula provides 22-24 gm protein and 360 calories per 100 gm. Each child is to be given 75 gm. of the mixture to provide 18 gm of good quality protein and 300 calories and would cost 10 paise per head. Currently, 15.5 million children are being provided annually with recipes from *Balahar*. The Sadguru Seva Sangh Trust has also put out a product called *Sukhadi*, based initially on CSM powder but later on prepared from groundnut and soya meals, grams, etc., mixed with wheat flour, gur and ghee. It has got 10.9, 64.7 and 15.3 per cent protein, carbohydrate and fat respectively together with some of the essential vitamins and minerals. The total cost of preparing and distributing *Sukhadi* is 22 paise². The "Win Food" developed by the Ghandigram Institute of Rural Health and Family Planning, Madurai district, has been demonstrated to have wide acceptability. One hundred gram of "Win Food" provides 450 calories and 20 gm protein, which are enough for supplementary feeding³. Based on locally available protein rich foods and local food habits Sri Avinashilingam Home Science College Coimbatore, has developed an infant food which has good acceptability and nutritional quality.⁴ The problem of supplementary feeding is of such a magnitude that it can be best tackled by decentralised programmes. The latter, of necessity, must be based on a wide variety of choices from locally available materials, instead of a centrally processed products. For this purpose knowledge of the nutritive values of local food materials and its dissemination to the concerned population group should form an essential component of the programmes. It is to be emphasised that locally available foods would combine nutrition with cheapness. Modern Bakeries (India) Ltd., provide special milk bread for pre-school children in nine cities, namely, Ahmedabad, Bombay, Bangalore, Hyderabad, Calcutta, Cochin, Delhi, Kanpur and Madras under the Special Nutrition Programme

1 Souvenir on the occasion of Seminar on Nutritious Food for meeting social objectives, organised by Food & Nutrition Board and others in May, 1973 at New Delhi (p. 19).

2 *Ibid.* (p. 41)

3 Hyderabad Workshop on Better Foods for Better Nutrition (1973), Sponsored by the Protein Foods and Nutrition Developments Association of India (p. 78).

4 Rajammal P. Devadas *et. al.* (1974) Indian J. Nutr. Dietet. 11,257.

of the Social Welfare Department, Government of India. The bread is specially enriched with skim milk powder and groundnut protein isolate and fortified with vitamins and minerals, so that 100 gm of bread per child would provide 9.2 gm protein and 275 calories. The number of children covered by the programme is nearly one million.

9.8.5 The supplementary feeding programmes are meant to evolve by trial recipes made from local foods. This principle not only enables to cut down overhead and transport charges, but also helps bring out recipes which agree well with the familiar and cultural habits of the people and their economic conditions. In general, four types of preparations are suggested: (a) semisolid (porridge); (b) ready-to-eat mixtures (powders); (c) solid forms; (*laddu, barfi* or *upma*), and (d) snacks, e.g., biscuits. One such programme which is being operated since 1971 by the Government of India with a financial outlay of Rs 5 crores for a five-year period covers nearly 4 million pre-school children (3—5 years).

School Lunch

9.8.6 The school lunch or midday meal programme is perhaps the earliest measure of nutritional relief taken up on an organised way. This measure had its origin in 1925 when the Corporation of Madras initiated it for about 500 poor school children. The Government of Tamil Nadu was the first to sponsor it in 1957 to cover all children throughout the State. Later, several States followed suit. In 1961, the School Health Committee stated that in 1960-61 the school lunch was in operation in about 40,300 schools covering 2.46 million children all over the country, and in view of varied benefits, the measure has been continued and extended further to cover 12 million school children. On the basis of diet and nutrition surveys carried out by the ICMR, it was decided that the school lunch for children of 6—12 years age-group should provide at least a third of the daily nutritional requirements. This was set at 500 calories, about 5—18 gm protein and 100 I.U. of vitamin A.

Other Programmes

9.8.7 Of the others, the Applied Nutritional Programme (ANP) is meant to motivate people in the rural areas to produce more of protective foods for their consumption at home. For this purpose, the Government provided all assistance for digging wells for irrigation of crops in school garden and kitchen garden; facilities for running poultry farm for the community and for the school and facilities to increase fish cultivation etc. Besides these features, there was the demonstration feeding programme. The Composite Nutrition Programme is meant to cover the residuary

areas not already covered by ANP and Family and Child Welfare Programme. It imparts nutritional education through demonstration feeding of children of 1—16 years and women. Special nutrition programmes are also designed to give priority to tribal areas, urban slums and drought-prone rural areas. In the famine and drought stricken areas feeding programmes are extended to landless agricultural labourers and marginal farmers. Even in these programmes, the highest priority is given to children, the pregnant and lactating mothers.

9.8.8 There are two programmes with specific objectives: (a) prevention of nutritional anaemia, and (b) prevention of blindness due to vitamin A deficiency. The first programme covers expectant and nursing women and also six-month old children. The incidence of nutritional anaemia in these groups is relatively high, leading to high maternal risk and also high morbidity in pre-school children. The relief programme in operation provides 60 mg iron and 500 μ g (microgram) folic acid to be given to all pregnant and nursing women. The supplement is given for the last 100 days before delivery, and for at least six months after delivery for nursing women. This covers 4 million women and children. The supplementation of iron and folic acid to children is done at appropriate dosages. This programme is implemented by almost all the States through antenatal clinics, maternity centres and child welfare centres.

9.8.9 The second programme to prevent severe vitamin A deficiency in children stipulates administration of vitamin A as a prophylactic. Vitamin A is stored in the liver of children for a fairly long period and prevents severe deficiency which may lead to blindness. An oral dose of 200,000 I.U. of vitamin A is given to every child once in six months. This work is carried out through child welfare centres and *balwadi*. The programme is already in operation in eleven States and is to be extended to other States. At present, the coverage is for roughly 1.6 million children (1—3 years).

Assessment of Programmes

9.8.10 A periodical assessment of the programmes is necessary. It may be made in terms of the general improvement of health of the subject as measured by the present parameters, and other information of a general nature, viz., acquisition of nutrition, knowledge and attitude of the subject, family and community as a whole towards nutrition programmes. Where as the experiences of workers in the nutrition programmes in several States have been rewarding, some problems have also been brought to sharp focus as a result of critical evaluation. These are chiefly organisational defects; the extent to which supplements have become substitutes for the regular meal at home; the extent of effective reach out to the beneficiaries;

the problem of intercurrent infections; problems of adequate facilities for storage etc. In the light of experience gained so far, the merits and demerits of the 'take home' and 'on the spot feeding' projects require closer scrutiny. There seems to be scope for a rethinking whether nutrition rehabilitation programmes should be based on family as a unit rather than the school child as a unit.

Integration of Programmes

9.8.11 The multiplicity of organisations involved in nutrition relief and rehabilitation programmes calls for coordination amongst them. Several departments and agencies of the Central and State Governments and voluntary agencies are engaged in implementation of the feeding programmes. Following the Planning Commission's recommendation, most of the States have set up coordination committees with representatives of all the departments and agencies concerned in the nutrition programmes. Steps have to be taken to see that these committees function effectively at the district levels. A part of the responsibility of organising supplementary feeding for school going children can possibly be undertaken by the teaching institutions and universities concerned. It is increasingly felt that if nutrition programmes are to bring the desired results to a community, other factors such as environmental sanitation, control of infection, early immunisation, family care, antenatal care, postnatal care, child care, family planning, which are all interrelated should simultaneously be attended to. Recently the Department of social Welfare in the Ministry of Education, Social Welfare and Culture has come out with an Integrated Child Development Services Scheme, which embodies a package of services to be rendered in a spirit of cooperation and coordination amongst various departments. The integrated scheme envisages services to children upto the age of six years. Since the mother plays the key role in transmitting the services effectively, expectant mothers and nursing women, and other women in the age group 15—44 are also the beneficiaries. There is considerable merit in this kind of scheme and should receive financial and administrative support.

9.8.12 Education is one of the most potent instruments for making any nutrition programme useful and effective. Besides the usual mass media and organs of publicity, there should be special campaigns at intervals covering as much as possible the project area. These efforts should be supplemented by home visits of *ball sevikas*, short courses to be imparted to women in groups, and demonstration of cooking and feeding. For these purposes the various health and nutrition education programmes of the Departments of Health, Agriculture, Social Welfare and Rural

Development both at the Central and State levels may be made use of. The contents of the training courses should emphasise the best utilisation of local foods so that dependence on sophisticated foods imported either from abroad or from other regions of the country is minimal. In regard to the proper choice of such local food materials and maintenance of their qualities during processing and distribution, the home science faculties of agricultural universities should be able to render necessary help and advice.

9 NUTRITION AND FOOD SCIENCE RESEARCH

9.9.1 The seeds for nutrition research were sown as early as 1918 when Sir Robert McCarrison initiated work on deficiency diseases and their relation to food and diet. The link to agriculture was also envisaged as early as 1926 when the Royal Commission on Agriculture (RCA) paid a visit to Coonoor to acquaint themselves with McCarrison's work. They fully realised that nutrition research had an important role in agricultural development and improvement of nutrition of the people in general. The RCA recommended in 1928 the establishment of a central institute for nutrition research. Almost five decades hence a gamut of research activities on nutrition and food science have sprung up. The important areas of activities are: (a) research on clinical and public health nutrition; (b) research on food science relating to food composition and food technology; (c) nutrition training; and (d) nutrition education. The institutions engaged in various fields of nutrition research are the National Institute of Nutrition (NIN), Hyderabad, and the Central Food Technological Research Institute, Mysore. Besides these two, there are other centres where research on nutrition or food science has been in operation in a limited sense. These centres are: All India Institute of Hygiene and Public Health, (AIIPH), Calcutta (clinical and public health nutrition and training), Bhabha Atomic Research Centre (BARC) (food preservation and food irradiation), Wellcome Nutrition Research Unit, Christian Medical College, Vellore (clinical & public health nutrition) and Defence Food Research Laboratories, Mysore (nutritional problems of armed forces). Some institutes have been established under the aegis of the Indian Agricultural Research Institute, New Delhi (nutritional upgrading of cereals and pulses), National Dairy Research Institute, Karnal (nutritional aspects of milk and milk products); Rice Research Institute, Cuttack (rice quality), Fisheries Research Laboratories, Cochin (nutritional aspect of fish and fish products) etc. Centres engaged in nutrition training and education are: Nutrition Department, M.S. University, Baroda; Home Science Colleges, agricultural universities, besides the above mentioned

NIN, CFTRI and AIHPPH. Most of the Health Directorates in the States have a nutrition division mainly engaged in public health nutrition work, involving diet and nutrition surveys and participation and supervision of nutrition rehabilitation programmes in the State. A brief review of the research and training activities in nutrition of some of these centres is presented below.

9.9.2 The National Institute of Nutrition, Hyderabad, has been carrying out research on human nutrition for more than 55 years. Its major fields of activities are related to food and diet; elucidation of factors responsible for the various diseases of dietary etiology; identification of the factors responsible for malnutrition and development of appropriate methods for prevention and control; training young scientists in the methodology of nutrition research; training a cadre of public health nutrition personnel to manage the nutrition action programmes; helping the dissemination of nutrition knowledge among the general public and advising government and other organisations on questions of nutrition. Important research activities of the Institute include:

- (i) revision of nutrient requirements for Indians which form the basis of assessing gross food requirements;
- (ii) nutrient composition of Indian foods;
- (iii) food toxins such as those present in *Lathyrus* and groundnut—their removal and control;
- (iv) fortification of foods with calcium iron and iodine;
- (v) growth standards for Indian children;
- (vi) protein-calorie malnutrition in children—its incidences, measurement and remedy;
- (vii) vitamin A deficiency and its remedy;
- (viii) pellagra and its remedy;
- (ix) iron nutrition and anaemia especially in pregnant and nursing women;
- (x) malnutrition and mental function;
- (xi) nutrition and infection;
- (xii) training programmes;
- (xiii) nutrition education and extension, publication of literature, and setting up museums; and
- (xiv) nutrition monitoring.

9.9.3 Diet and nutrition surveys have been largely carried out by the nutrition units of the Health Departments of the State Governments. There have been some anomalies in sampling, selection of comparable groups of population etc. In order that a uniform and standardised technique is used throughout the country, it has been decided to set up a National Nutrition Monitoring Bureau with Central reference laboratories at the National Institute of Nutrition, Hyderabad. This step would not only

eliminate the earlier defects but also help in making valid comparative studies possible. Besides, the setup would carry out a continuous surveillance of the state of nutrition of the people through longitudinal surveys, and periodically examine the dietary and consumption trends. A team of medical personnel and nutritionists has been specially trained for this project, which would reinforce the existing setup at the State level. The Task Force on Nutrition appointed by the Planning Commission and the National Committee on Science and Technology has been assigned to draw up a comprehensive plan for nutrition on a national scale taking into consideration the population size, agricultural production and the priorities for nutrition rehabilitation programmes. The NIN forms an important constituent of this setup.

9.9.4 The Central Food Technological Research Institute, Mysore, established in 1950, has been mainly devoted to problems of food sciences and food technology in particular. The research work of this Institute has been of great help to several food industries. The areas of research at the Institute relate to the following aspects :

- (i) problems of food storage and control of insect infestation;
- (ii) improvements in parboiling designs;
- (iii) problems related to preservation of foods, particularly fruits;
- (iv) formulation of infant-weaning foods, protein-rich multipurpose foods and their supply in bulk scale;
- (v) development of detoxification procedure for removal of aflatoxins in groundnut flour;
- (vi) fabrication of pilot plants for the manufacture of processed foods such as *Balazar*, *Balamul*, *Miltone* (vegetables-based toned milk);
- (vii) evaluation of nutritional quality of some of the processed foods by field trials on children;
- (viii) formulation of certain food products such as instant tamarind pulp (tamcon);
- (ix) research on utilisation of certain plant products such as guar meal, cotton seed meal, deoiled seed meals from rapeseed, mustard, linseed, rice bran for extraction of oil; and
- (x) improvising better designs of *dal* hullers for reducing losses in hulling and synchronizing designs for removal of husk.

The Institute offers courses for training specialists in food technology, International Certificate Course on fruit preservation, on infestation control in raw and processed foods and the processing of animal foods.

9.9.5 In regard to storage of food grains, several standardised formulations have been tested for insecticidal activity. In a survey of storage fungi affecting the quality of foodgrains, the harmful effects of *Penicillium citrinum* and *Aspergillus Candidus* have been examined. The export

potential of some common fruits such as bananas, grapes, mangoes has been increased as a result of successful means of prolonging shelf-life and delaying ripening processes.

9.9.6 The All India Institute of Hygiene and Public Health, Calcutta, has a Nutrition Division and has been mainly engaged in research on clinical and public health nutrition. The major areas of interest are : protein calorie malnutrition, vitamin A deficiency, field trials on protein-rich food etc. Besides, the Institute offers two training courses (a) Diploma in Dietetics, and (b) Diploma in Nutrition.

9.9.7 The Bhabha Atomic Research Centre, Bombay has a Biochemistry and Food Technology Division where problems of food preservation by irradiation are investigated. It examines the possibilities of preservation of foods by irradiation. After an exhaustive study, this Centre proposes to use the irradiation technique on a commercial scale for increasing the shelf-life of foods. It is claimed that these irradiated foods are harmless and safe for human consumption.

9.9.8 Defence Food Research Laboratories, Mysore, are primarily oriented to research problems related to food and nutrition of the defence forces namely, improvements in peace time rations for different armed forces; development of special rations, emergency rations, and survival rations; formulating processed foods for special regions as precooked foods; compressed foods for high altitude etc.

9.9.9 Several institutes of Indian Council of Agricultural Research have been carrying out research on nutritional aspects of some food crops, oilseeds and animal foods, particularly, milk and fish. The problems of nutritional upgrading of cereals, millets, pulses and oilseeds are being tackled on a big scale through All India Coordinated Research Projects for rice, wheat, maize, sorghum and other millets, oilseeds and pulses. The NIN, Hyderabad has been effectively collaborating in these projects. Several promising high yielding varieties of wheat, rice, maize, sorghum, bajra and ragi have been screened for nutritional quality. The most commonly used criteria have been total protein; amino acid profile, particularly lysine for all cereals and millets, and lysine and leucine for sorghum mineral content, e.g., calcium and iron; and vitamin B complex in rice varieties. Some of the important findings may be stated as follows :

- (i) in wheat varieties the protein content goes up to 15 per cent, but the variation in lysine content is not very large. It is, therefore, possible to selectively breed a wheat variety with high protein content without greatly sacrificing the lysine content;
- (ii) the lysine content in most rice varieties is quite good. A fairly high protein content is seen in ADT-27;
- (iii) in maize, the composites from opaque-2 such as Shakthi, Ratan and Protina are high in lysine. Some of these have been used

in feeding trials on children and have proved nutritionally superior; and

(iv) in sorghum, varieties like CHS1, CHS2, and Swarna have shown promising nutritional qualities. The lysine content tends to decrease with increase in total protein content. Leucine content and protein levels go up parallelly. Varieties with low leucine and high lysine but average protein level are being actively explored.

Expansion and Coordination

9.9.10 A review of the research activities on foods science, nutrition and food technology shows that there is ample scope for expanding and coordinating research activities in these fields. A national grid of operational research for streamlining and coordinating the activities of organisations and laboratories responsible for research (namely, ICAR, ICMR, CSIR, BARC, FCI, CFTRI, AIIHPH, and NIN) on food science and allied disciplines with the objective of applying research to actual problems in the field is recommended. In the light of the existing state of research on food science and allied disciplines in the country, it is found that certain areas of research have remained more or less untrdden, or require deeper study. Some of these are suggested below :

- (i) nutritional dimension in drought and scarcity affected areas;
- (ii) quality control of animal feeds;
- (iii) utilisation of agricultural by products as additional sources of nutrition to animals and human beings;
- (iv) new foods;
- (v) intermediate and small scale technologies for manufacturing "food mix" (baby foods, weaning foods and protein-rich foods), processing and preservation of perishable foods, etc;
- (vi) utilisation of wild legumes, wild fruits for better nutrition;
- (vii) influence of preharvest diseases on changes in nutrient composition in grain and relation to health hazard, susceptibility of preharvest disease affected foodgrains to postharvest attack by fungi etc;
- (viii) nutrition orientation in agricultural education at undergraduate, graduate, postgraduate and higher levels; and
- (ix) nature and extent of nutrition "leakage", caused by infection, ill-health, diseases and environmental conditions.

10 NUTRITION EDUCATION AND EXTENSION

9.10.1 The improvement of nutrition of any population depends on three important factors: (a) availability of the right type of food; (b) purchasing

power to provide oneself and family with nutritious food; and (c) nutrition education. Nutrition education creates awareness and the right atmosphere and outlook for good food. It must be adequately realised that with the varying purchasing power of people at different strata of the society the nature of the food consumed varies. Nutrition education should, therefore, be different for different groups of people. Nutrition awareness is often found lacking in the planners, administrators, economists, policy makers, community leaders, educationists, and even in the food and agricultural scientists, and medical men. In this context, it is necessary to examine the existing facilities and channels for nutrition education at various levels.

State Government Level

9.10.2 Most of the States have a nutrition bureau in the Health Department under an Assistant Director of Public Health (Nutrition). Each bureau is provided with a small laboratory and is the centre for training health personnel who are assigned nutrition survey and nutrition education work in the districts. Some of the States have also regional nutrition units. These units impart nutrition education in small exhibitions at the time of fairs and festivals. The existing staff (one or two health inspectors) of these units is inadequate in number and training, to undertake any intensive effort in nutrition education.

Central Government Level

9.10.3 There is a Nutrition Adviser to the Government of India, located in the Directorate General of Health Services. His functions are of advisory nature on all matters relating to food and nutrition. There is no provision for action programme on nutrition or nutrition education. The Central Health Education Bureau periodically gives training to public health personnel of various cadres and levels. In the relevant programmes nutrition is usually incorporated. The Bureau also publishes a monthly in English and another in Hindi in which attention is focussed on problems related to nutrition and health, family planning and nutritional status, food safety and food hygiene; nutritional problems in the community and measures for prevention. The ICMR has been responsible for training personnel in nutrition research and nutrition action and education programmes. These training programmes are given at the NIN, Hyderabad. Nutrition education is an important part of the training programmes. The Institute has brought out several popular publications on nutrition in English and other local languages. Two educative films on protein-calorie malnutrition and vitamin deficiency have been produced. The Institute publishes a popular quarterly bulletin "Nutrition", focussing

all important aspects of nutrition in simple language for lay intelligent public. A special booklet on teaching nutrition in middle and high schools has been brought out.

9.10.4 The food and Nutrition Board in the Union Ministry of Agriculture & Irrigation has been organising nutrition education both in the central and regional sectors. The main forums for nutrition education have been popularisation of "*paushnik atta*", Modern Bread, *Balahar*, community canning centres and participation in exhibitions with emphasis on food and nutrition. The short-term training course for women on preservation of fruits includes nutrition education imparted to mahila mandals, women's clubs and other women's forums.

9.10.5 The Directorate of Extension of the Union Ministry of Agriculture & Irrigation has a Home Science & Nutrition Cell at the National level to provide technical support to the ongoing nutritional relief programmes. In its capacity to provide technical guidance to the training of various categories of extension personnel, farmers and farm women, it has been helping in building up the appropriate nutritional component in all the training programmes. Thus, in the field of high yielding variety programmes, studies are being carried out on the cooking aspects of cereals and millets and on developing, testing and standardising new recipes acceptable to the consumers in the test kitchens set up in four regions of the country. Projects intended to demonstrate methods of preventing food wastage and nutrient loss are being taken up in villages in association with the Department of Food under the domestic storage of foodgrains programme. Studies are being conducted on methods of preservation of food, fruits and vegetables at the domestic level on improved cooking practices and popularisation of less familiar foods like soyabean. The improvement of nutritional status depends on the gain in knowledge, skills and change in attitude of the consumer. Therefore, there is a great need for setting up an agency charged with the dissemination of information and motivation of the consumer to accept, where necessary, new food and acquire new food habits. An important task of the extension personnel should be to divert consumption of, say, single cereals and to diversify food habits so that there is greater emphasis on balanced diets. To realise fully the impact of nutrition education programmes and to have an extensive coverage, the existing infrastructure needs to be strengthened. The number of field workers having good grasp of subject matter should be increased. They should have in addition, the aptitude to work with the rural people. The home science and nutrition education wings of the Directorate should be strengthened with more technically qualified persons. It is essential to have facilities for inservice training and ensure availability of technically competent supervisory staff from the State to the block level.

9.10.6 The departments of Social Welfare, Rural Development and Edu-

cation involve themselves in nutrition education in a limited sense while implementing feeding programmes among vulnerable segments of the population. An orientation training given to the personnel of these departments would enlarge the scope of nutrition education. The training facilities available in each State with the gramsevak and gramsevika training centres, farmers' training centres, extension education institutes and National Institute of Community Development may be pressed into service for this purpose.

9.10.7 There are a number of home science colleges in the country where the undergraduates, graduates and post-graduates have nutrition as one of the subjects and are required to do nutrition extension work in villages. For lack of a definite objective, this kind of work has failed to make an impact on the community, except in one or two isolated instances. However, the services of extension staff of agricultural colleges and universities may be gainfully exploited for the purpose of spreading nutrition education in the rural areas primarily those coming under their academic jurisdiction.

Means of Nutrition Education

9.10.8 Several means and methods have been used in nutrition education. Important among them are : (a) popular talks and group discussion; (b) demonstration and exhibition; and (c) pamphlets and broadcasting on nutrition in local languages. All these means should be fully exploited. In addition to these, nutrition action programmes have themselves created the forum for nutrition education. Community nutrition programmes, school lunch programmes, kitchen gardens in houses and schools setting up small scale poultry farms, fish ponds and fish cultivation, all these have been used as tools for nutrition education in the community. Demonstration feeding programmes for pregnant and nursing women have been used to educate the women about the importance of good nutrition during pregnancy and lactation. Nutrition programmes for pre-school children have been useful in educating and motivating mothers to prepare nutritious recipes for children from locally available foods. Folk songs folklores, folk playlets etc., have to be used for injecting basic ideas on the importance of nutritious foods. Festivals and the feasts and the recipes prepared on such occasions have to be used as tools for nutrition education. Besides these, several other means of intervention and propagation of nutrition education may be thought of. Important amongst these are school curricula, teachers' training, professional curricula such as those of medicine, agriculture, food science and animal science, and professional organisations. The manner in which each of these may play the desired role is briefly stated in the following paragraphs.

School

9.10.9 Nutrition education has to start from early childhood. This must be suitably phased from the primary, middle and secondary school years. The general objectives of this stage of nutrition education are : (a) to motivate children to want to eat for good growth, health and activity; (b) to develop good food habits ; (c) to know the use of locally produced foods; and (d) to learn good food hygiene. In order to incorporate nutrition education in school curriculum, suitably trained teachers are necessary. All teachers' training colleges must include a basic course in nutrition education. The teachers in service must be given a short-term orientation course in nutrition education during vacations. Summer schools can be arranged every year in various centres such as home science colleges and agricultural universities or other nutrition centres. School health inspection offers yet another forum for nutrition education. This is being done in all schools but in a very haphazard way. The major drawback is perhaps that a single doctor has to examine thousands of pupils in the course of a few days. School medical inspection must be done more thoroughly giving individual attention to children and adequate advice to parents about nutritional care of children. Each school, or a cluster of schools to start with, must have a medical officer permanently attached to it. It is also possible to have on loan the periodical consultancy service of a qualified dietician for a cluster of schools and their boarding houses.

Medical Profession

9.10.10 Nutrition education through the doctor or the nurse is always received with great confidence by the people. The role of the diet in the treatment of disease is also important and, therefore, it is necessary that medical graduates and nurses under training receive enough knowledge on nutrition. Several disciplines in medicine now demand intensive application of practical nutrition. These are paediatrics, social and preventive medicine, obstetrics, etc. Nutrition must be one of the subjects for all these disciplines to enable the specialists to impart nutrition education while discharging their professional duties. In course of time there must be a dietician-cum-nutritionist in every district to supervise and advise on diets in all the hospitals in the district. In course of time the medical officer should be trained to do the job as part of his responsibilities. Health personnel in each primary health centre must also receive a nutrition orientation course to be able to educate the community.

Other Professions

9.10.11 Nutrition is a multifaceted subject dealing with food production,

food processing and distribution, social and cultural patterns, etc. It is therefore, appropriate that nutrition education is provided in all these professional spheres. Agricultural scientists, animal scientists, food technologists, sociologists and social welfare workers should be given a nutrition orientation course to enable them to fulfil their professional obligations in a more meaningful way. Important among the trainees are the agricultural graduates and scientists. A comprehensive nutrition orientation course can be incorporated into the curriculum and made compulsory in all the agricultural universities and agricultural colleges. Such a scheme sponsored by the ICAR is already in operation in six agricultural universities. For agricultural scientists under training, it is desirable that in addition to a general orientation to agriculture, sufficient attention is devoted to studies with a close relevance to human nutrition.

Manpower Requirement

9.10.12 There does not appear to be any dearth of manpower for nutrition education. Starting with a simple village level worker, the primary school teacher, the teachers in the middle school and secondary school, the health educator, the agricultural extension worker, the home economics extension worker, the Gramsevaks, the Gramsevikas and the social worker—all can, in their own way, take part in one or the other aspect of nutrition education for the community as a whole. The effects of such coordinated efforts would reflect themselves in the consumption patterns, consumer preferences for nutritious foods and other indices of health of the community. This massive effort in nutrition education has its returns in better production in the farm, in the factory, better performance in schools, less morbidity, less sickness and more healthy community, ready to contribute to the economic development of the country.

Professional Organisations

9.10.13 There is yet another excellent source which has not been adequately tapped in the matter of promoting nutrition education. These are the various associations and societies established to promote scientific research and scientific awareness. At present, they mostly confine their activities to publishing periodicals and bulletins. Some of the important organisations of this category are :

- (i) Protein Foods and Nutrition Development Association of India
- (ii) Nutrition Society of India
- (iii) Association of Food Scientists and Food Technologists
- (iv) Oil Technologists Association
- (v) Horticultural Society
- (vi) Indian Council of Child Welfare

- (vii) Indian Paediatric Society
- (viii) Indian Dairy Science Association
- (ix) Indian Medical Association
- (x) Indian Association of Animal Production
- (xi) Indian Home Science Association
- (xii) Indian Veterinary Association
- (xiii) Indian Dieticians Association
- (xiv) Indian Association for pre-school Education
- (xv) Indian Dental Association

All these organisations and their members in the various regions of the country must reach out and do intensive nutrition education in the community in rural and urban areas. These organisations will thus be able to fulfil their social obligations in addition to being academic forums.

11 NUTRITION POLICY

9.11.1 Nutrition requirements are known to vary with age, sex, occupation, body weight, ambient temperature etc. It is customary to arrive at an average value of per capita requirement by assuming certain norms for each category weighting them in the usual way. An analysis of food consumption patterns prevalent in the country suggests that the per capita average need not be the same. The variations appear to be predominantly due to body weight and ambient temperature. Food consumption which should be rationally based on the principles of nutrition must take into consideration these variations. The pattern or the composition of food materials may widely vary because of the many possible permutations and combinations. Of these, those compositions which are nutritionally sufficient and at the same time readily available would be acceptable provided they suit the palate and the pocket of the consumer. Food habits are often influenced by local availability, but not necessarily the most desirable from the point of view of nutrition. Knowledge of the nutritional values of food materials locally available and of the general principles of nutrition may guide the consumer to derive full benefit out of the food he normally takes. With regard to food production the emphasis should justifiably be on increased production on a regional or local basis of those materials which are technologically feasible and at the same time enhance the quality of diets. Losses of nutrition by processing, storage and cooking are preventable. Programmes of action in this direction can be successfully implemented provided nutrition education is suitably intervened at various levels. Nutrition education should be limited to the basic principles of nutrition and how to apply them in practice. Knowledge about the antinutritional and toxic factors and simpler methods of eliminating them should also be a part of

nutrition education. The production and supply of nutritious foods alone are not enough to ensure proper nutrition unless the physical and environmental health of the consumer is improved. Malnutrition often results from the lack of sanitation and preventive measures against infection etc., and lack of unpolluted water and environment. Production and distribution of foods in proper quantity and quality cannot be assured by mere wishing. Problems of logistics and the buying power of the people would have to be tackled. There will, therefore, be certain population groups which would require special treatment. Programmes of action aimed at ameliorating the nutritional conditions of these groups have to be initiated on government levels and encouraged at private levels. These programmes cannot be made so extensive as to cover all the vulnerable groups in their entirety. Nevertheless, such programmes may set examples for others to emulate and catalyse consciousness of social welfare. Malnutrition is so acute and widespread that the answer lies not in distributing finished products at cheap or subsidised rates but in encouraging production of suitable raw materials and making them available within the easy reach of the needy. On a national level nutrition is linked in various ways with the economy of the country. The aim should be to provide proper nutrition to the people and to fight malnutrition and associated maladies. The formulation of a sound nutrition policy becomes in this context obligatory.

Nutritional Status

9.11.2 The nature and extent of malnutrition and the factors responsible for it can be assessed by means of careful surveys. They should bring out amongst other things the nutritional status, deficiencies and disorders in such a way that norms of balanced dietary allowances may be established in a realistic manner for each sector or region as need be, instead of prescribing a uniform pattern for all. The nutritional status of the population needs to be examined by periodical surveys, in order to find out the trend and revise, if necessary, actions and programmes. One of the defects of the present diet surveys relates to the non-recognition of unconventional foods consumed by rural population and of foods consumed in public catering houses in urban areas. This defect should be remedied. An analysis of vital statistics, morbidity and mortality data helps identify groups of population characterised by high risks. The growth of children needs to be studied extensively and continuously. This is done by anthropometric measurements of weight, height, skinfold thickness, arm circumference etc. National standards or norms have to be established for each age group for comparison. A clinical examination of different groups of population reveals the major nutritional disorders in each region. These clinical

examinations could be substantiated by a battery of biochemical tests. Clinical examination would focus the frank deficiencies and biochemical tests would identify population groups at risk. The major nutritional problems to be identified are: (a) calorie-protein deficiency; (b) vitamin A deficiency; (c) nutritional anaemia; and (d) goitre, fluorosis, pellagra, lathyrism and similar regional diseases.

Demand and Supply Formulation

9.11.3 Depending on the pattern of food production as determined by exigencies of the prevailing situation, broad formulation should be made of the best possible balance sheet, commensurate with minimum nutrition and socio-economic status of the population groups. This would set in motion the desirable trend in food consumption from the nutritional point of view, and ultimately help to evolve the right pattern of production. Special care and consideration are necessary in regard to formulations relating to the nonfarm population, usually urban, which greatly influence the demand for foods. The diversion of some primary foods for conversion into processed and sophisticated foods to meet consumer demands of urban and affluent sections may sometimes lead to their artificial scarcity and cause hardship to low income groups. Diversion to industries should be restricted to surplus foods only. Greater considerations apply to the farm population which, being mainly rural, influences the production and supply of foods. Of still greater importance are the special risk groups, namely, infants, children in the postweaning period, preschool children, school children, pregnant and nursing women and industrial workers.

9.11.4 Policy relating to food supply should ensure production of adequate quantities of pulses, oilseeds, leafy vegetables and fruits for proteins, calories, vitamins and minerals. The supply of staple foods is ensured provided a suitable bufferstock is maintained, but the preservation of quality during processing, storage and public distribution is obligatory from the point of view of nutrition. This aspect is often ignored causing considerable loss, thereby undoing the assured benefits of bufferstock. Proper stress should be laid on the possibility of supplying raw materials based on agriculture for animal and poultry feeds.

Nutritional Leakage Prevention

9.11.5 To get the full benefits of nutrition through better supply and demand formulations, it is necessary to prevent nutrition leakage by controlling infection, immunisation and other integrated health care programmes. This indirect aspect of nutrition needs careful consideration and relevant preventive measures have to be carefully formulated. These

measures relate to (a) quality and hygiene of diets, including consumer protection; (b) control of morbidity, childhood diseases, weaning diarrhoea, water-borne and respiratory infections, deworming programmes, malaria, tuberculosis etc; and immunisation programmes; and (c) curative and preventive public health, MCH services, child care, safe water supply and improvement of environmental sanitation.

Nutrition Intervention

9.11.6 Several programmes for nutrition intervention may be formulated and implemented, for example, direct nutrition intervention by (a) covering vulnerable groups; (b) increasing agricultural output and influencing consumption through rationing, etc.; (c) upgrading food crops through genetic methods; (d) fortification of food products, where essential, with minerals and vitamins; (e) maintaining quality and hygiene of foods; (f) providing prophylactic and other preventive measures; and (g) by arranging for nutrition education at various levels. However important, not all the above measures are within the financial capability of many developing countries. But some of the programmes according to urgency and availability of finance should be launched keeping in mind the enormous cost of malnutrition.

12 SUMMARY OF RECOMMENDATIONS

9.12.1 The following is a summary of the important recommendations made in the text of this Chapter.

1. Data on protein and energy consumption should be compiled sectorally according to economic groups, in order to make them useful for planning and distributing food according to nutritional requirements. Because of differences in dietary habits of the people from one State to another, the survey data should preferably be available on a State basis.

(Paragraph 9.2.8)

2. The Indian Council of Medical Research should re-estimate the energy and protein requirements and their distribution according to age, sex, body weight and ambient temperature making usual allowances for the pregnant and lactating mothers, and thereby arrive at more reliable per capita values.

(Paragraph 9.2.9)

3. While recommending dietary allowances the various factors determining them should be rationally looked into. A uniform standard of protein and calorie intakes should not be enforced. Greater attention should be paid to local foods which are often more beneficial from the

point of view of nutrition.

(Paragraphs 9.2.11 and 9.2.12)

4. With a view to striking a compromise between nutrition, palatability and cost, a series of diets should be prescribed from locally available foods to suit a wide range of pockets. This exercise should be carried out on the basis of a whole region where food availability is of similar pattern.

(Paragraph 9.2.15)

5. There is urgent need for the processing of foodgrains and improving storage structure to prevent appreciable loss both in quality and quantity caused by rodents and insects, by providing ratproof godowns. Such facilities should, as far as possible, be cheap and developed indigenously. Measures to control storage pests by using chemicals should take precaution against pollution.

(Paragraphs 9.4.2 and 9.4.3.)

6. Production patterns should preferably be oriented to meet nutritional needs of each region. For this purpose, priority should be given to meeting the quantitative deficit in calorie requirement. Nutrition oriented food production planning should be initiated at the district level. For better nutrition the high yielding and improved varieties of cereals, pulses and oilseeds should have preference.

(Paragraph 9.5.6.)

7. A diversification of foods is desirable even for a single nutrient, not because of taste but for the sake of complementarity, as is especially true in the case of proteins.

(Paragraph 9.5.7)

8. Possibility of microbial production of oil for nonedible purposes should be explored.

(Paragraph 9.5.9)

9. Edible oilseeds and oilcakes being supplementary sources of oil and protein, their antinutritional and toxic constituents, if any, should be removed before they are used. Promotional measures should be taken to increase internal consumption rather than exporting them as cheap raw materials. It would be more appropriate to process oil meals for export purposes.

(Paragraphs 9.5.10 and 9.5.11)

10. In order to meet the shortage of edible oils, besides stepping up production of traditional oilseeds, new sources of edible oils should be fully explored. Oil yields from available sources should be extended by solvent extraction by the use of food-grade solvents.

(Paragraphs 9.5.12 and 9.5.13)

11. The nutritional significance of vegetables and fruits in general and more particularly leafy vegetables has not been fully recognised by

consumers. Their current production and consumption should, therefore, be augmented through research and extension efforts. Appropriate incentives and adequate facilities for their storage, transport and marketing should go hand in hand with production.

(Paragraphs 9.5.14 and 9.5.15)

12. Measures to increase the production of foods of animal origin, such as milk, fish, meat and eggs have to be intensified in a phased manner. There should be adequate infrastructure for cold storage, quick means of transport and marketing facilities for efficient delivery at the consumer level.

(Paragraph 9.5.16)

13. Unconventional foods such as algae, yeasts, mushrooms, petroproteins, leaf proteins are expensive from the point of view of initial cost of outlay and energy inputs. However since technical know-how for commercial production of such foods is available within the country, efforts should be made to explore the scope of utilisation of these sources as animal feeds. Until research provides clearance on the basis of toxicological evaluation, these sources should not be utilised for human consumption.

(Paragraphs 9.6.1 to 9.6.3)

14. Food quality, food safety and food sanitation have been the weak areas leading to health hazards and improper utilisation of good foods and nutrients derived from them. The quality control in regard to raw foods looked after by the Food Corporation of India does not adequately cover all items and, wherever covered, is not properly enforced, as seen by the results at the consumer's level. The defects have to be eliminated, for which stringent measures are called for.

(Paragraph 9.7.3)

15. The danger of food contaminants such as naturally occurring toxins, chemicals such as pesticides and food additives needs to be elaborately studied. Methods of detoxification as in the case of *Lathyrus sativus* and control of fungal contamination by quick drying and better storage should be popularised through education and extension work. The increased use of pesticides in preharvest and postharvest conditions is apt to result in appreciable pesticide residues which are likely to be harmful to consumers. There should be a permanent machinery to conduct a continuous surveillance of the effects of pesticide residues in foods.

(Paragraphs 9.7.4 and 9.7.5)

16. The use of irradiation as a means of extending storage life and prevention of deterioration and insect infestation should be examined from the point of view of economic feasibility as well as possible harmful effects of irradiation on the consumer and the nutritional quality of foods. For the purpose of eliminating possible harmful effects, wherever

necessary, a minimum period of storage after irradiation should be made mandatory before such irradiated foods are distributed to consumers. For both radioactive fallout and possible harmful effects of irradiated foods, appropriate monitoring agencies should be set up.

(Paragraph 9.7.6)

17. Food adulteration has become a great menace to health and its effects may be aggravating to the undernourished population. The existing loopholes in the Prevention of Food Adulteration Act should be plugged and punishment for food adulteration made severe and deterrent. Facilities for checking adulteration by on-the-spot tests must be provided and consumer awareness should be aroused through education and consumer guidance societies. There is need for an exhaustive National Food Sanitation and Safety Act to ensure consumer safety in regard to raw foods, processed foods and food preparations served in catering establishments.

(Paragraphs 9.7.9 and 9.7.10)

18. Many industries dealing with processed foods have come into being as a result of industrialisation and urbanisation. Depending as they do on surplus agricultural produce spread over wide areas in the rural sector, industries have to think of smaller viable units of processing located in rural and semi-urban areas. Many of the products currently marketed are not covered by the ISI marking. They and the new ones should be brought under the purview of the ISI as quickly as possible.

(Paragraph 9.7.14)

19. Nutritional upgrading of foods through food fortification must be carefully examined in the context of food habits. Fortification of cereals in a big country like India involves enormous cost apart from problems of logistics. Unless backed by proper monitoring and followup studies fortification of foods would illserve its purpose.

(Paragraph 9.7.15)

20. Public eating places in towns and cities are an outcome of urbanisation and industrialisation. But the hygienic condition and the quality of food served there leave considerable room for improvement. There should be one eating houses sanitation committee attached to the municipality or the corporation, to supervise periodically all public eating places and enforce minimum sanitary conditions. The assistance available with the regional institutes of catering technology and applied nutrition should be taken advantage of by industrial managements in organising model canteens and restaurants in industrial locations for the benefit of their workers.

(Paragraph 9.7.17)

21. In the implementation of nutrition programmes, organisational lapses stand out prominently. The Government should, therefore, examine their achievements and bottlenecks and lay greater emphasis

on cost, efficiency, management, exploitation of locally available foods, motivating greater participation of the people, effective reach out to the beneficiaries, and efficient delivery systems.

(Paragraph 9.8.10)

22. The coordination committee set up at the district level for the integration of nutrition programmes involving several organisations should be made to function effectively by bringing into its fold other interrelated aspects of community development, such as environmental sanitation, control of infection, early immunisation, family care, family planning, etc. The Intergrated Child Development Services Scheme of the Ministry of Education and Social welfare, which embodies a package of services in a spirit of cooperation and coordination amongst various departments, merits support.

(Paragraph 9.8.11)

23. Supplementary programmes can be made more effective through education and choice of cheap and locally available foods. In this task governmental departments such as those of Health, Agriculture, Social Welfare, Rural Development and the home science faculties of agricultural universities should work together.

(Paragraph 9.8.12)

24. A review of researches carried out so far by various organisations in the country on food science and allied disciplines suggests that there is urgent need for creating a national grid of operational research for streamlining and coordinating reasults of research with the definite objective of applying them to solve actual problems in the field. In the light of experiences in the fields of research on food science and allied disciplines, it is possible to pinpoint a number of important areas in which research programmes should be either initiated or intensified on a priority basis.

(Paragraph 9.9.10)

25. To realise fully the impact of nutrition education programmes and to have an extensive coverage, the existing infrastructure needs to be strengthened.

(Paragraph 9.10.5)

26. A vast scope exists and sufficient manpower available for the extensive use of mass media for nutrition education in the rural and urban areas. All such possible means should be vigorously exploited.

(Paragraph 9.10.8)

27. Nutrition education should be made compulsory in agricultural, animal science and medical faculties right from the undergraduate level. Nutrition should also be included in school curriculum and teachers' training curriculum.

(Paragraphs 9.10.10—9.10.12)

28. On a national level nutrition is linked with economy of the country. The aim should be to provide proper nutrition to the people and to fight

malnutrition and associated maladies. The formulation of a sound nutrition policy becomes in this context obligatory.

(Paragraph 9.11.1)

29. The nutritional status should be assessed by means of carefully planned surveys. They should elicit information about the nutritional status of the vulnerable groups of the population. The major nutritional problems to be identified are: calorie-protein deficiency, vitamin A deficiency, nutritional anaemia, goitre, fluorosis, pellagra and lathyrism.

(Paragraph 9.11.2)

30. Depending on the pattern of food production as determined by exigencies of the prevailing situation, broad formulation should be made of the best possible balance sheet, commensurate with minimum nutrition and socio-economic status of the population groups.

(Paragraph 9.11.3)

31. The diversion of primary foods for conversion into processed and sophisticated foods to meet consumer demands of urban area should be restricted to surplus foods only.

(Paragraph 9.11.3)

APPENDIX 9.1

Daily Allowance of Nutrients for Indians¹
(Recommended by the Nutrition Expert Group in 1968)

(Paragraphs 9.2.2 and 9.5.2)

Group	Particulars	Net calories (gm)	Prote- ins (gm)	Calcium (gm)	Iron (gm)	Vitamin-A		Thiamine (mg)	Ribof- lavin (mg)	Nico- tinic acid (mg)	Asco- rbic acid (mg)	Folic acid (mg)	Vita- min B12 (mg)	Vita- min D (I.U.)
						Retinol	Beta- caro- tene (mg)							
1	2	3	4	5	6	7	8	9	10	11	12			
Man	sedentary work	2,400 2,800 3,900	0.4-0.5 55	20	750	3,000	1.2 1.4	1.3 1.5	16 19	50	100	100	100	1
	moderate work						2.0	2.2	26					
	heavy work						1.0	1.0	13	.50	100	100	100	1
Woman	sedentary work	1,900 2,200 3,000 +300	0.4-0.5 45 30 +10	30	750	3,000	1.1 1.5	1.2 1.7	15 20					
	moderate work						1.0	1.2	15					
	heavy work						1.5	1.7	20					
Pregnancy	(second half of pregnancy upto 1 year)	+700 120/kg 2.3-1.8 kg 100/kg 1.8-1.5 kg	+20 0.5-0.6 1/mg	30	1150 4,000 300	4,000 — 1200	+0.4	+0.4	+5	50	80	130	103	
Infants	0-6 months	1,200	17											
	7-12 months													
children	1 year													
	2 years													
	3 years													
4-6 years		1,500	20											
	7-9 years	1,800	22											
	10-12 years	2,100	33											
adoles- cence	13-15 years		41	0.6-0.7	25									
	boys	2,500	55		35									
	girls	2,200	50											
	16-18 years													
	boys	3,000	60	0.5-0.6	25									
	girls	2,200	50		35									

¹ ICMR Special Report Series No. 60, Dietary Allowance for Indians (1968).

APPENDIX 9.2

(Paragraphs 9.2.3 and 9.5.2)

Balanced Diet Pattern
Statement I—Adult Men (Indian)

(gm)

	Sedentary work		Moderate work		Heavy work	
	Vegetarian	Meat-eating	Vegetarian	Meat-eating	Vegetarian	Meat-eating
cereals . . .	400	400	475	475	650	650
pulses . . .	70	55	80	65	80	65
green leafy vegetables . . .	100	100	125	125	125	125
other vegetables . . .	75	75	75	75	100	100
roots and tubers . . .	75	75	100	100	100	100
fruits . . .	30	30	30	30	30	30
milk . . .	200	100	200	100	200	100
fats and oils . . .	35	40	40	40	50	50
meat and fish . . .	—	30	—	30	—	30
eggs . . .	—	30	—	30	—	30
sugar and jaggery . . .	30	30	40	40	55	55
groundnut . . .	—	—	—	—	50*	50*

* An additional 30 gm of fats and oils can be included in the diet in place of groundnut.

Statement II—Adult Women (Indian)

(gm)

	Sedentary work		Moderate work		Heavy work		Additional allowance during	
	Vege-tarian	Meat eating	Vege-tarian	Meat eating	Vege-tarian	Meat eating	Preg-nancy	Lacta-tion
cereals . . .	300	300	350	350	475	475	50	100
pulses . . .	60	45	70	55	70	55	—	10
green leafy vegetables . . .	125	125	125	125	125	125	25	25
other veg. . .	75	75	75	75	100	100	25	25
roots and tubers . . .	50	50	75	75	100	100	—	—
fruits . . .	30	30	30	30	30	30	—	—
milk . . .	200	100	200	100	200	100	125	125
fats & oils . . .	30	35	35	40	40	45	—	15
sugar and jaggery . . .	30	30	30	30	40	40	10	20
meat and fish . . .	—	30	—	30	—	30	—	—
eggs . . .	—	30	—	30	—	30	—	—
groundnut . . .	—	—	—	—	40*	40*	—	—

* An additional 25 gm of fats and oils can be included in the diet in place of groundnut.

APPENDIX 9.2 (Contd.)

Statement III—Children (Indian)

(gm)

	Pre-school children				School children			
	1—3 years		4—7 years		7—9 years		10—12 years	
	Vege- tarian	Meat- eating	Vege- tarian	Meat- eating	Vege- tarian	Meat- eating	Vege- tarian	Meat- eating
cereals	150	150	200	200	250	250	320	320
pulses	50	40	60	50	70	60	70	60
green leafy vegetables	50	50	75	75	75	75	100	100
other vegetables } roots and tubers }	30	30	50	50	50	50	75	75
fruits	50	50	50	50	50	50	50	50
milk	300	200	250	200	250	200	250	200
fats and oils	20	20	25	25	30	30	35	35
meat and fish } eggs }	—	30	—	30	—	30	—	30
sugar and jaggery	30	30	40	40	50	50	50	50

Statement IV—Adolescent Boys and Girls (Indian)

(gm)

	Boys				Girls	
	13—15 years		16—18 years		13—18 years	
	Vege- tarian	Meat- eating	Vege- tarian	Meat- eating	Vege- tarian	Meat- eating
cereals	430	430	450	450	350	350
pulses	70	50	70	50	70	50
green leafy vegetables	100	100	100	100	150	150
other vegetables	75	75	75	75	75	75
roots and tubers	75	75	100	100	75	75
fruits	30	30	30	30	30	30
milk	250	150	250	150	250	150
fats and oils	35	40	45	50	35	40
meat and fish	—	30	—	30	—	30
eggs	—	30	—	30	—	30
sugar and jaggery	30	30	40	40	30	30
groundnut	—	—	30*	50*	—	—

* An additional 30 gm. of fats and oils can be included in the diet in place of groundnut.

(Paragraph 9.2.4) Food Consumption Pattern in Different States of India (1960-69)

State	Number of surveys	Rice	Wheat	Millets & other cereals	Total cereals	Pulses	Leafy vegetables	Other vegetables	Fruits	Fats and oils	Milk and milk products	Meat, fish and egg	Sugar and jaggery	Condiments
		1	2	3	4	5	6	7	8	9	10	11	12	13
Andhra Pradesh	111	335	10	121	466	29	9	34	1	11	63	11	9	32
Bihar	62	267	97	89	453	42	21	69	3	8	20	8	5	3
Gujarat	1	73	13	339	425	43	26	49	—	5	7	6	6	5
Jammu and Kashmir	3	212	18	359	589	8	163	63	—	10	14	3	12	14
Karnataka	45	NA	NA	NA	607	26	9	19	1	2	56	3	NA	12
Kerala	37	296	38	7	341	24	8	170*	36	7	52	52	29	29
Madhya Pradesh	2	37	356	259	652	55	4	41	86	19	138	11	38	27
Maharashtra	9	241	61	196	498	33	17	62	9	15	49	27	31	7
Punjab	22	42	378	99	519	35	44	93	13	17	317	7	97	2
Rajasthan	31	8	183	266	457	43	10	30	1	34	94	2	16	19
Tamil Nadu	114	288	11	57	356	16	8	52	5	6	26	13	6	20
Uttar Pradesh	113	161	154	133	448	55	38	97	21	16	91	8	32	10
West Bengal	24	336	86	—	422	30	51	112	3	17	52	30	22	7
All India	574	241	84	109	434	34	21	71	10	12	69	14	19	18

Suggested allowances for a typical balanced diet

— — — — — 370 70 110 125 37 38 180 35 40 —

¹ Report of Nutrition work done in States—1960-69, National Institute of Nutrition, ICMR, Hyderabad; Recommended daily allowance of nutrients and balanced diets—Recommended by Nutrition Expert Group—ICMR Sp. Report Series No. 60, and Annual Report on Nutrition activities carried out in the States and Union Territories for the year 1968, compiled by Nutrition Cell of the Directorate General of Health Services, New Delhi.

* Tapioca
NA—Not available.

APPENDIX 9.4

(Paragraph 9.2.7)

Consumption Pattern of Foodstuffs by Tribal Population¹

Tribe surveyed	State	Rice	Wheat	Millets and other cereals	Total cereals	Pulses	Leafy vege- tables	Other vege- tables	Flesh foods	(Gram per capita per day)		
										Fats and oils	Milk and products	Fruits
Abors	Assam	615	—	7	622	11	42	33	33	—	—	14
Dubias	Gujarat	33	—	258	291	5	2	49	—	2	21	—
Dubias	Maharashtra	400	—	11	411	11	—	25	2	2	2	—
Malpahari	Bihar	421	—	79	500	23	19	9	2	—	—	—
Mompas	NEFA	109	13	336	458	10	36	9	—	2	19	—
Onges	Andamans	—	—	—	—	—	—	240	725	—	—	—
Santhal	Bihar	481	—	23	504	23	6	26	4	3	—	—
Sauria Pahari	Bihar	89	—	495	584	35	11	16	7	2	—	—
Uralis and Kanikkars	Kerala	166	—	—	166	25	9	886	—	5	—	11
Wariis	Maharashtra	330	—	14	344	9	6	23	8	2	1	1

¹ Sen Gupta, P. N. (1960) 'Dietaries of Primitive Tribes' from THE ADIVASIS, Publications Division, Ministry of Information & Broadcasting, Govt. of India, p. 86; Report (1959) of the Department of Nutrition, Govt. of Maharashtra (1960) p. 12. Lal, S. B. (1954) Indian J. Med. Res., 42 167; and Annual Report (1965) National Institute of Nutrition, Hyderabad.

APPENDIX 9.5

(Paragraphs 9.2.7)

Protein and Calorie Content of the Diets of Tribal Population Groups¹

Tribe surveyed	State	Nutrients per capita	
		Proteins (gm)	Calories
Abors	Assam	69.5	2,430
Dublas	Gujarat	35.1	1,210
Dublas	Maharashtra	40.6	1,540
Iruelas	Tamil Nadu	26.5	1,310
Kotas	Tamil Nadu	50.3	1,870
Kurumbas	Tamil Nadu	36.9	1,690
Malpahari	Bihar	51.3	1,850
Momas	NEFA	53.3	2,530
Nicobarese	Great Nicobar Islands (Union Territories)	108.0	2,532
Onges	Andamans (Union Territories)	136.5	2,620
Santhal	Bihar	50.6	1,900
Sauria Pahari	Bihar	74.2	2,210
Todas	Tamil Nadu	48.4	2,410
Uralis and Kanikkars	Kerala	30.1	1,830
Warlis	Maharashtra	36.1	1,350

1 Sen Gupta, P. N. (1960) "Diaries of Primitive Tribes", from THE ADIVASIS, Publications Division, Ministry of Information and Broadcasting, Government of India, p. 86; Report (1959) of the Department of Nutrition, Government of Maharashtra, Bombay (1960) p. 12; Annual Report (1965) National Institute of Nutrition, ICMR, Hyderabad and Roy, J. K. and Roy, S. C. (1969), Indian J. Med. Res. 57, 5 (5); Bose S. (1964) Economy of Onges of Little Andamans, Man in India 44, 4.

[See also Diet Atlas of India (1971), National Institute of Nutrition (ICMR), Hyderabad].

APPENDIX 9.6

(Paragraphs 9.5.2 & 9.5.4)

Improved Diet at Moderate Cost
Statement I—Rice-based (Southern)

Item	gm/day	30 days (kg)	Protein (gm)	Calories	Cost* (Rs)
rice	350	10.50	24.5	1,575	29.93
wheat	100	3.00	12.0		3.09
pulses	50	1.50	10.0	175	6.02
leafy vegetables	100	3.00	1.0	50	2.25
root vegetables	30	0.90	0.5	30	1.50
other vegetables	30	0.90	0.5	30	1.35
milk	75	2.25	2.5	50	5.09
sugar/jaggery	50	1.50	—	200	3.23
oil	20	0.60	—	180	4.70
fruits	30	0.90	0.5	20	3.00
groundnut	25	0.75	6.2	140	3.23
			57.7	2,450	63.39

* Based on Average Consumer Price, 1973-74, Ministry of Labour.

APPENDIX 9.6—(Contd.)

Statement II—Wheat-based (Northern)

Item	gm/day	30 days (kg.)	Protein (gm)	Calories	Cost* (Rs.)
wheat	350	10.50	42.0	1,575	10.82
rice	100	3.00	7.0	8.55	
pulses	50	1.50	10.0	175	6.02
leafy vegetables	100	3.00	1.0	50	2.25
root vegetables	30	0.90	0.5	30	1.50
other vegetables	50	1.50	1.0	50	2.25
milk	100	3.00	3.5	65	6.78
sugar/jaggery	50	1.50	—	200	3.23
oil	20	0.60	—	180	4.70
fruits	30	0.90	0.5	20	3.00
groundnut	25	0.75	6.2	140	3.23
				71.7	2,485
					52.33

Statement III—Millet-based (I)

Item	gm/day	30 days (kg.)	Protein (gm)	Calories	Cost* (Rs.)
jowar	300	9.00	30.0	1,575	14.13
rice	150	4.50	11.0	8.55	12.83
pulses	50	1.50	10.0	175	6.02
leafy vegetables	100	3.00	1.0	50	2.25
root vegetables	30	0.90	0.5	30	1.50
other vegetables	30	0.90	0.5	30	1.35
milk	60	1.80	2.0	40	4.07
sugar/jaggery	40	1.20	—	160	2.58
oil	20	0.60	—	180	4.70
fruits	30	0.90	0.5	20	3.00
groundnut	25	0.75	6.2	140	3.23
				61.7	2,400
					55.66

Statement IV—Millet-based (II)

Item	gm/day	30 days (kg.)	Proteins (gm)	Calories	Cost* (Rs.)
rice	250	7.50	17.5	875	21.38
jowar	100	3.00	10.0	350	4.71
ragi	100	3.00	7.0	300	4.41
pulses	50	1.50	10.0	175	6.02
leafy vegetables	100	3.00	1.0	50	2.25
root vegetables	30	0.90	0.5	30	1.50
other vegetables	30	0.90	0.5	30	1.35
milk	60	1.80	2.0	40	4.07
sugar/jaggery	50	1.50	—	200	3.23
oil	20	0.60	—	180	4.70
fruits	30	0.90	0.5	20	3.00
groundnut	25	0.75	6.2	140	3.23
				55.2	2,390
					59.85

* Based on Average Consumer Price, 1973-74, Ministry of Labour.

APPENDIX 9.6 (Concl'd.)

Statement V—Kerala Region

Item	gm/day	30 days (kg)	Protein (gm)	Calories	Cost. (Rs.)
rice	250	7.50	14.0	875	21.38
wheat	50	1.50	6.0	175	1.55
tapioca	150	4.50	1.0	225	2.97
pulses	50	1.50	10.0	175	6.02
leafy vegetables	100	3.00	1.0	50	2.25
other vegetables	50	1.50	1.0	50	2.25
milk	60	1.80	2.0	40	4.07
sugar/jaggery	50	1.50	—	200	3.23
oil	20	0.60	—	180	4.70
fruits	60	1.80	0.5	50	5.99
coconut & groundnut	50	1.50	12.5	280	3.77
fish	50	1.50	7.5	100	10.52
				55.5	2,400
					68.70

* Based on Average Consumer Price, 1973-74, Ministry of Labour.

APPENDIX 9.7

(Paragraph 9.7.7)

Extent of Food Adulteration in Different States¹

States	Percentage of adulteration	
	1964	1971
Andhra Pradesh	30.0	37.8
Assam	31.1	—
Bihar	16.3	66.7
Delhi	15.6	37.0
Gujarat	19.2	—
Himachal Pradesh	33.0	63.4
Kerala	21.5	26.4
Madhya Pradesh	51.0	55.7
Tamil Nadu	25.0	26.4
Manipur	57.0	—
Maharashtra	44.4	41.4
Mysore	34.0	40.8
Orissa	25.6	41.8
Punjab	27.3	22.2
Rajasthan	45.0	—
Tripura	25.2	31.2
Uttar Pradesh	30.4	19.9
West Bengal	22.9	32.3

¹ Reports of the Director-General of Health Services.

(Paragraph 9.8.4)

National Nutrition Programmes Operated During the Fourth Five Year Plan

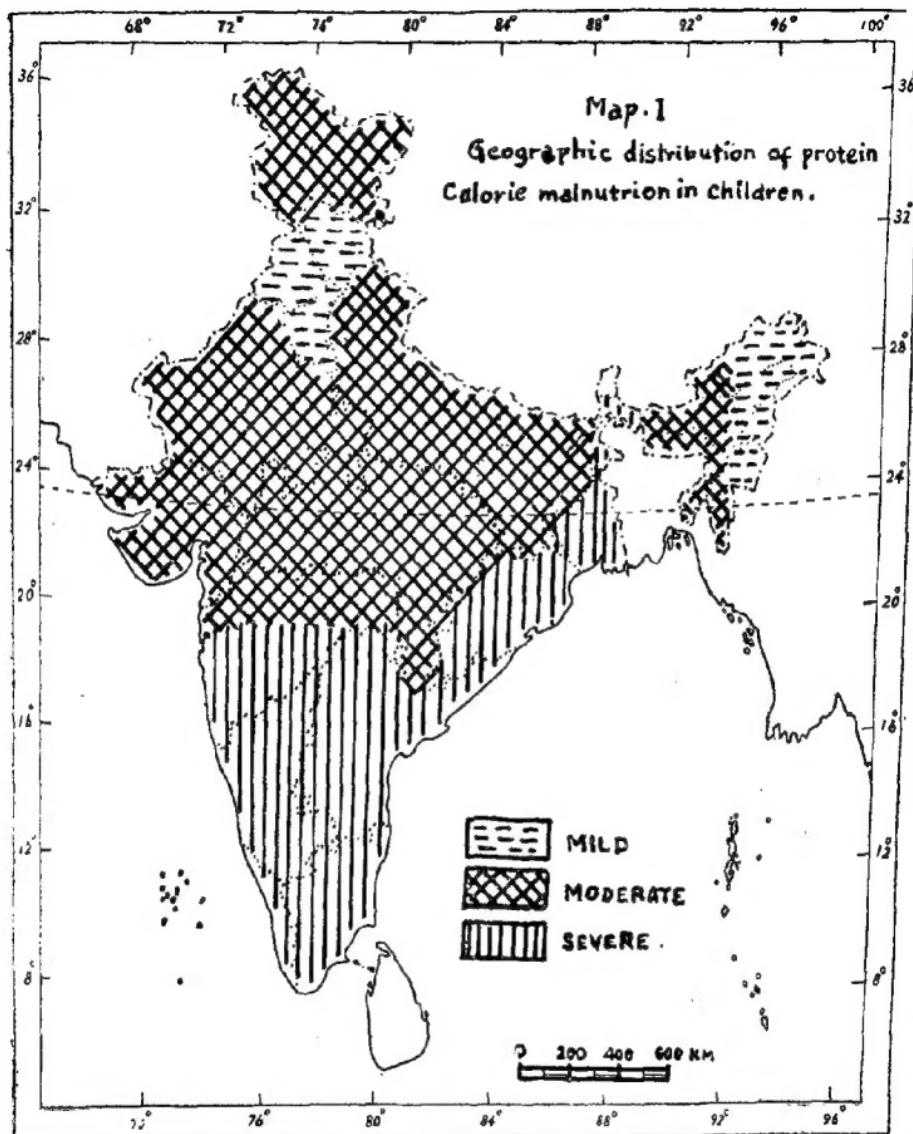
Programme	Target group	Coverage (million nos.)	Plan outlay for 5 years (Rs. lakhs)	Cost per beneficiary per day (incl. overheads) (paisa)	Nutritional content of the programme
1	2	3	4	5	6
special nutrition programme	preschool children, pregnant and nursing women (including tribals and urban slums)	2.0	20.00 (1972-73)	23.5	supplementary feeding providing 300 calories and 8-10 gm protein per child; 500 calories and 25 gm protein per pregnant and nursing woman for 250 days in a year.
nutritional programme for pre-school children	children 3-5 years	2.15	6.00	16	supplementary feed providing 300 calories and 8-10 gm protein per child per day for 300 days in a year (Balaihar, CSM, or other protein rich foods).
school lunch programme	primary school children 6-12 years.	4.0	19.18	22	school-lunch providing 500 calories and 18-20 gm protein per child per day for 200 days in a year.
prevention of nutritional anaemia	expectant and nursing women and children (6 months—2 years)	4.00	4.05	75/year	60 mg of iron and 500 mg of folic acid per day to pregnant and nursing women through MCH and antenatal clinics for the last 100 days before pregnancy and six months after delivery.

NUTRITION

APPENDIX 9.8 (Contd.)

1	2	3	4	5	6
prevention of blindness due to Vitamin A deficiency	preschool children	16 lakhs	10.2	50/years	oral dose of 200,000 I.U of vitamin A per child once in six months.
applied nutrition programme	pregnant and nursing women and preschool children.	450 community development blocks	100.0		nutrition education major component; eggs, vegetables, milk powder as supplements.
composite nutrition programme	women and preschool children	1200 community development blocks	60,000		demonstration feeding for 80 women and children (1.5 years) in each centre for 25 days in a month; major component is nutrition education.
production of protein rich foods; Balamul, Miltone	school and pre-school child feeding and weaning foods	25.1 lakh tonnes	67.0	95 paise 2.0 } per kg.	
industrial nutrition programme					{ same as under nutrition programme for pre-school children and special nutrition programme.
					(a) pre-school children (b) pregnant & nursing women (c) workers
					industrial canteens
					subsidised snacks and subsidised lunch through industrial canteens as advised by the Department of Labour Welfare.

APPENDIX 9-9



Based upon Survey of India map with the permission of the Surveyor General of India.

(C) Government of India copyright 1976

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line

The boundary of Meghalaya shown on this map is as interpreted from the North-Eastern Areas (Reorganisation) Act, 1971, but has yet to be verified.

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PART II "POLICY & STRATEGY"

ERRATA

Page No.	Para/ Sub-para/ Table	Line/row/ column	As printed	As desired
1	2	3	4	5
4	5.2.5	5	over whelming	overwhelming
4	Do.	7	forestyl	forestry
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9	5.2.13	3	importanc	imports
13	5.2.25	7	tractor	tractors
14	5.2.26	5	production food	production of food
17	5.2.34	3	throuth	through
20	5.3.2	last	then	than
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23	5.3.11	1	effort	efforts
26		4	imporve	improve
26		5	resaerch	research
27	Appendix 5.1	col. 4 heading	per capital	per capita
27	Do.	footnote	109	109
34	6.3.2	2	emelioration	amelioration
40	6.3.16	4	labourers also	labourers are also
44	6.3.25	15	routing	routine
47	6.3.30	14	weild	wield
52	6.3.46	2	more are	more, are
64	7.2.1	5	sufficiently	sufficient
64	7.2.3	2	production. It	production, it
70	7.3.6	4	devetailing	dovetailing
71	7.3.9	4	baffalo	buffalo
71	7.3.10	8	dairing	dairying
74	7.3.20	8	facilitates	facilities
75	7.3.22	4	exports	export
79	7.3.40	3	a manpower	manpower
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109	footnote	1	of a	of
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121	8.6.1 (3)	1	valuation	evaluation
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128	45	2	List or	List II or
130	9.2.1	1	work	world
131	9.2.3	8	ingradients	ingredients
137	9.2.9	9	respectively	respectively,
137	9.2.9	16	wieght	weight
137	9.2.9	17	lectating	lactating
138	9.2.11	12	deficient	deficient
139	9.2.13	3	influenced	influence
140	9.2.15	4	in take	intake
140	9.2.15	20	manable	amenable
144	9.4.4	16	imparing	impairing
146		2	constituent,	constituents,
149	9.5.7	3	portein	protsin
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151	9.5.12	8	kernal	kernel
152		4	revent	prevent
152	9.5.15	11	vegetables, even	vegetables. Even
158	9.7.9	7	simultaneous	simultaneously
160	9.7.14	3	and aid	can aid
161	9.7.17	18	against	again
164		20	eatings	eating
164	footnote 1	1	Ghandigram	Gandhigram
166	9.8.9	6	Nutrious	Nutritious
167	9.8.12	5	Ths	This
168	9.9.1	21	<i>ball sevikas</i>	<i>bal sevikas</i>
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172	9.9.10(iii)	1	proteincalorie	protein-calorie
173		4	by products	byproducts
185	22	6	starta	strata
190	Appendix 9.3	Heading	Intergrated	Integrated
197	Appendix 9.9	Do.	(1960-69)	(1960-61) (Paragraph 9.3.2)